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ABSTRACTS OF TUBERCULOSIS

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Radiology in Diagnosis.—Radiology is in danger of undermining the position of the stethoscope in the diagnosis of pulmonary tuberculosis, and radiological evidence can elucidate the problem in each case in a way that is not possible by any other method. It is of greatest value in establishing a definite diagnosis in the early case before a definite clinical picture has developed. The commonest lesion in children is the Ghon focus. Epituberculosis is described as a nonspecific pneumonic consolidation surrounding a localized tuberculous focus and is said to be allergic. The Mantoux (intracutaneous) test is always positive. The radiographic picture of acute miliary tuberculosis is characteristic. Assmann's focus, a localized subclavicular caseous pneumonia, about a shilling in size, is seldom seen. Annular rings have a slight degree of infiltration about them and develop rapidly. They begin as a small tuberculous cavity, and involvement of the bronchus communicating with it produces a valvular or one-way obstruction. Respiration gradually inflates the cavity into a large bulla. Radiology is important in the planning and control of treatment and in the assessment of the healing process.—*The Value of Radiology in the Diagnosis of Pulmonary Tuberculosis, S. C. Shanks, J. State Med., November, 1935, xliii, 629.*—(*L. F. B.*)

Oblique Roentgenography and Pleural Adhesions.—X-ray visualization of intrapleural adhesions is dependent upon their physical properties as determined by morphology, position or direction, and the amount of surrounding pneumothorax as a contrast medium. Various types of adhesions are difficult to differentiate when projected in one plane only. To visualize suspending adhesions fully, they should be exposed at a right angle to the direction of the X-ray beam in order to avoid foreshortening or complete obscurity because of overlying lung. Adhesions in the costovertebral gutter or pleural symphysis in this region may be obscured in a frontal projection. By coöperation between fluoroscopist and technical assistant the best angle for the projection of adhesions can be found and the films exposed. In the 40 cases under consideration, stereoscopic anterior oblique exposures were commonly used. This position, rather than posterior oblique, permits better control of the scapula. The patient should be erect, with both hands on the head and elbows touching, or approximated, in front. The focus-plate-distance used was 72 inches. Operative inspection was afforded in 30 of the cases, thoracoscopy in 20, thoracoscopy and open pneumolysis in 8, and open pneumolysis in 2. Oblique films were of definite assistance in 24 of the cases. Of the remaining 6, two were of no value because of technical errors in exposures, 3 presented no adhesions not shown in frontal films, and in one the patient was improperly posed. Of the 10 unoperated

cases, oblique films showed the inadvisability of operation in three, and the remaining 7 were not operated upon for clinical reasons. A major advantage of oblique projection is the visualization of such adherent areas as to preclude operative intervention, and a fixation or suspension of the lung in areas not seen in the frontal view.—*The Evaluation of Intrapleural Adhesions by Oblique Roentgenography, C. Haight and C. B. Peirce, J. Thorac. Surg., October, 1935, v, 83.*—(*L. F. B.*)

Reaction of Pulmonary Tissue to Lipiodol.—Lipiodol was instilled into the lung of a patient who had an epithelioma of a lateral branch of the right bronchus. Because of the position of the tumor, the oil became trapped in bronchiectatic cavities of the lower bronchi. Roentgenograms taken a year after the injection of oil, and one week before the death of the patient, showed the lipiodol still present in the bronchiectatic cavities. At autopsy the lungs were removed with the mediastinum. The right lung was adherent over its whole surface, but more firmly over the lower lobe. The diaphragm was separated from the right lung with extreme difficulty, and the diaphragmatic surface of the lung was covered with a thick white tissue, 2 cm. in thickness, near the mediastinum. The texture was homogeneous, and the consistence harder than mucoid tissue, but softer than cartilage. It was firm and elastic and no fluid exuded from it. The cut-surface of the right lung presented a large, round epidermoid carcinoma of a lateral branch of the main bronchus growing in a massive manner into the lung and main bronchus. No metastases were present in the mediastinal lymph nodes. The parenchyma of the lung about this tumor was compressed and fibrous. Throughout the lower portion of the lobe no evidence of alveolar structure was seen on macroscopic examination, but lobulated areas of fawn-colored material stood out in marked contrast to the deep reddish-brown of the parenchyma. These masses varied in size from a few millimeters to 1 cm. on cross-section. The edges of these areas were definite, but slightly blurred; the central zone was homogeneous. The most noticeable feature of these areas was the regularity of distribution and the lobulation in them. Frozen sections taken to include the diaphragmatic surface with several of the buff colored areas were stained with sudan-III and haematoxylin. As no fat usually occurs in these areas the stained material can be interpreted as abnormal. Since this material can be freed from the section with a needle in the form of liquid oil droplets and occupied areas shown to be opaque in the roentgenogram, it is assumed the red staining material is lipiodol. When the lipiodol is removed by a fat solvent and the section is counterstained by eosin, the areas where the lipiodol occurred are seen to be made up of small round nuclei. The cytoplasm is extremely scanty, slightly vacuolated and extends in fine interconnecting strands from one cell to the other. The lipiodol appeared to be enclosed in a form of cellular syncytium, and the origin of these cells is probably the supporting tissue of the bronchi. Between these areas, the parenchyma of the lung appeared as small channels with thick fibrous walls. No bronchi or epithelium were found and the whole lobe was remakably avascular. The thick hyaline tissue of the diaphragmatic pleural surface was made up of a peculiar form of granulation tissue with small capillaries running at right angles to the lung surface. These were widely separated by a material which did not stain for mucus and took eosin poorly, but showed a fine collagenous reticulum with Van Gieson's stain. Scattered throughout it were a small number of macrophages, some of which contained small droplets of lipiodol. Most of the lipiodol was extracellular and in close proximity to the capillaries. To liberate these droplets it was necessary to tear the tissue with needles so that it could not have been deposited during preparation of the section. The two outstanding features of this specimen are the reaction of the reticular tissue of the lung to the prolonged presence of lipiodol and the reaction of the pleural tissue. The reaction to lipiodol retained for long periods in the bronchi is the development of lipophages from the supporting connective tissues. No epithelial reaction occurs.—*Reaction of Pulmonary Tissue to Lipiodol, R. D. Wright, Am. J. Path., May, 1935, xi, 497.*—(*A. M. S.*)

Bronchoscopy in Asthma and Tuberculosis.—It is seldom necessary and usually unwise to bronchoscope an individual with locally uncomplicated tuberculosis. A tuberculous person may suffer from some associated lesion, such as bronchiectasis, bronchostenosis or carcinoma. In the 3 cases reported in which each was suffering from asthma-like attacks, associated with pulmonary tuberculosis, bronchoscopy offered an opportunity for definite diagnosis, gave relief, and was definitely life-saving in one. The first two cases showed obstruction of a main bronchus by tuberculous granulations, and symptoms were relieved by dilatation. Biopsy of tissue from the larynx of the third case showed an irregular

margin of stratified squamous epithelium overlying a granulomatous exudate with tubercle-formation. When the presence of an associated lesion which may require surgical treatment is suspected, the knowledge that the patient is suffering from active pulmonary tuberculosis does not constitute a valid reason for withholding bronchoscopic examination.—*Bronchoscopy in the Diagnosis of Asthma Complicating Pulmonary Tuberculosis, D. H. Ballon, Jr., J. Thorac. Surg., October, 1935, v, 103.*—(*L. F. B.*)

Tubercle Bacilli in Gastric Contents.—The significance of demonstrating tubercle bacilli by gastric lavage in children is still uncertain. There are differences of opinion as to whether such a finding indicates infectiousness, for example, in a child with hilar tuberculosis of the juvenile type unaccompanied by cough or X-ray signs of pulmonary involvement. The author, in a study of her own cases and those reported by others, points out that among various types of tuberculosis in children, the gastric contents contain tubercle bacilli most often in cases of miliary tuberculosis. Furthermore, the bacilli are demonstrable in the gastric contents of tuberculous children much more frequently in the earlier years, that is, in the age (up to 4 years) when dissemination of tubercle bacilli is more common. Moreover, as many as 50 per cent of children with miliary tuberculosis or extensive pulmonary lesions do not have demonstrable tubercle bacilli in the gastric contents. These observations lead the author to conclude that their presence in the gastric contents is to be classed with their occasional presence in the urine: that the finding results from a haematogenous dissemination of the bacilli which may be benign in character, or that the finding may be due to the presence of lesions in nearby organs other than in the lungs, for example, in pharyngeal lymphoid tissue. She feels that children who are not coughing up infected sputum should not be considered infectious, even if tubercle bacilli can be demonstrated in the gastric contents obtained by lavage.—*Zur Frage der Bedeutung des Tuberkelbazillennachweises im Magennüchternsekret, Edith Krüger, Arch. Kinderhk., August, 1935, cvi, 16.*—(*M. D.*)

Intracutaneous Tuberculin Test in Dispensary.—Four hundred and fifty-two children tested in 1931 and the early part of 1932, with a follow-up of two and one-half to four years. Most were tested only once with 0.1 cc. of 1–1000 O.T. (0.1 mgm). Incidentally, Hart has shown that the error with this dilution is only 4 per cent; hence, it seems a reasonable practical standard in dispensary work. Results are read in forty-eight or seventy-two hours after the test. Of the 452 children in this series approximately one-third were five years old and under and nearly one half between 6 and 10 inclusive. All were clinically examined and 80 per cent X-rayed. About one-half were contacts of definite cases of tuberculosis, and 61 were themselves diagnosed as tuberculous (58 pulmonary). The Mantoux tests for the entire group showed 68 per cent positive and 32 per cent negative. *Results of tuberculin tests:* Contacts of tuberculous sputum-positive cases showed 88 per cent positive; of nonpulmonary or sputum-negative cases, 51 per cent, the same figure as for noncontacts. Age made no important difference. In very young children strong reactions seemed to be associated with signs and slight suggestive symptoms. In the older group, strong reactions seemed more often associated with good resistance. If a young child or several in a family show a strong positive response yet home contact is denied or unknown, the adults should, if possible, be examined and reviewed. As in Leeds there are, up to 14 years, 50 per cent negative reactions, the test should be more generally used in excluding tuberculosis in the presence of a multitudinous variety of respiratory symptoms. The proportion of negatives should be still higher in places where hygienic conditions are better. The same is true in confusing nonpulmonary cases. *X-ray findings and Mantoux tests:* Practically all the positive reactors were X-rayed and certain negative reactors, especially tuberculosis contacts, were X-rayed, but only 57 of 145 negative reactors had this done. Of 295 films in Mantoux-positive cases, 14 per cent showed definite evidence of tuberculosis and 36 per cent some abnormality, possibly tuberculosis, while of 57 films in Mantoux-negative cases, 95 per cent were entirely negative and 5 per cent showed some abnormality. Definite X-ray evidence of tuberculosis consisted of (1) infiltrations mostly in the upper chest, morphologically characteristic of tuberculosis; (2) primary lung foci, with or without lymph nodes; (3) unmistakable tracheobronchial lymph nodes; and (4) thickened pleura. Tattersall's findings did not show any instance of a negative Mantoux test associated with roentgenographic evidence of calcified tracheobronchial lymph nodes, and he suggests that those who have reported such instances reëxamine their roentgenographic criteria. There seems to be no demonstrable relationship between the intensity of skin reactions and positive X-ray findings. Many with most intense reactions

show entirely negative films. On the other hand, those with so called "epituberculosis" commonly give positive skin reactions. These lesions may be interpreted as a strong allergic response to reinfection around a small focus. *Final observations:* The existence of a latent period between primary infection and secondary skin reaction must be borne in mind, especially when contact has been recent. We should know more about the skin reactions in young adults prior to their developing the acute form of disease commonly seen today. The question of desensitization of the highly sensitive also arises, stimulated by the work of Rich, in Baltimore, and others. Is it possible that an acute highly destructive onset might be averted by tuberculin desensitization? The question of latent infection is always arising in epidemiological surveys. Intelligent observations with tuberculin tests should help to answer some questions.—*Experiences of the Mantoux Test in Dispensary Work, N. Tattersall, Tubercle, April, 1935, xvi, 289.—(A. P.)*

PPD in Tuberculin Testing.—The increasing use of tuberculin is not limited to large scale survey work. With a drop in the extent of infection and postponement of first infection to beyond childhood its field as a diagnostic agent is constantly being extended. The chief defect in tuberculin-testing hitherto has been lack of uniformity in the preparations. Samples of Old Tuberculin everywhere vary widely in potency, in percentage figures from 20 to 1000, using 100 as the standard. Requisites for an ideal tuberculin include (1) specificity, (2) adequate potency, (3) constancy, (4) stability, and (5) absence of tendency to sensitize the nontuberculous. The chief difficulty in the use of O.T. arises out of variations in potency under the same conditions of preparation and the serious difficulties of standardizing it. In May, 1933, the Health Organization of the League of Nations recommended a product prepared by growing tubercle bacilli on a synthetic medium, of known potency according to the *International Standard.* However, even here varying external conditions affect the growth, media, and strength of tuberculin produced. The added presence in O.T. of a considerable quantity of foreign material from the media is not negligible. Purified Protein Derivative (PPD) is a colloid, is freed from polysaccharides, concentrated and precipitated by adding trichloracetic acid up to 10 per cent, and passes readily into aqueous solution with the aid of a small amount of sodium hydrate. It is highly active. *Surveys and studies:* During the fall of 1934 about 8,000 tests with PPD were made in schools and colleges throughout the United States. In the Eastern United States and on the Pacific Coast the reaction rate for entering college students is about 50 per cent, and in the Middle West 25 to 30 per cent. Fairly extensive testing has been carried out in 3 children's dispensaries in Philadelphia, a sanatorium for tuberculous children at Highland Moors, Wales, and an orphan asylum for girls in Cardiff, Wales. It was also used at the South Wales Sanatorium at Talgarth, where 45 tuberculous patients reacted positively, all but 2 to the first dose, the size of reactions averaging slightly smaller than in the tuberculous children at Highland Moors but larger than in apparently healthy children. Similar results were obtained at Brompton Hospital, London. *Summary: 1:* The use of tuberculin as a diagnostic agent has increased considerably in recent years, and a still greater diagnostic value is to be anticipated. *2:* Standardization permitting more accurate comparison of data seems timely. *3:* O. T., a sample of which has been selected as an International Standard, cannot be made uniformly, and its various preparations are inevitably solutions of unknown strength of the active principle. *4:* This active principle can be isolated and put up in dry form so as to maintain the essential requirements of a standard. It is a protein derivative, whose exact clinical composition is being investigated. *5:* Optimum dosages for testing are 0.00002 mgm. by weight for initial tests and 0.005 mgm. for those not reacting to the first dose. There is no evidence that cases of clinical significance are missed. Almost all adult patients with tuberculosis react to the first dose.—*A Standardized Tuberculin (Purified Protein Derivative) for Uniformity in Diagnosis and Epidemiology, E. R. Long, F. B. Siebert and J. D. Aronson, Tubercle, American Section, April, 1935, xvi, 304.—(A. P.)*

Serodiagnosis of Tuberculosis.—The antigen of Witebsky, Klingenstein and Kuhn used in the complement-fixation test for tuberculosis differs from other similar preparations in the removal from it of that fraction of the tubercle bacillus which is soluble in cold alcohol. An attempt was made to purify still further this antigen. It was found that the alcohol-soluble portion of Witebsky's antigen was practically inactive in the test. The specific complement-binding portion of the preparation is associated with the alcohol- and acetone-insoluble fractions of the tubercle-bacillus extract. Meyer's and Anderson's purified phosphatide fraction of the tubercle bacillus

is serologically active. By the addition of appropriate amounts of lecithin its binding capacity for complement is increased; yet this mixture does not attain the sensitivity of the Witebsky, Klingenstein and Kuhn antigen.—*Zur Frage der Antigenfunktion bei der Serodiagnostik der Tuberkulose, H. Eyer, Ztschr. Immunitätsforsch., July, 1935, lxxxv, 249.*—(*M. B. L.*)

Serodiagnosis of Tuberculosis.—The author used the complement-fixation test with the Witebsky, Klingenstein and Kuhn antigens, and, simultaneously the flocculation reaction with the same antigen and Meinicke's extract, on the sera of 411 tuberculous and 279 nontuberculous persons. Of the cases, 70 per cent of pulmonary and 60 per cent of extrapulmonary tuberculosis gave positive results. The complement-fixation and flocculation reactions act as a check upon, and supplement each other.—*Der serologische Nachweis der Tuberkulose mittels der Komplementbindungs- und Immunoflockungsreaktion unter Verwendung des Antigens von Witebsky, Klingenstein and Kuhn, C. Schlesmann, Ztschr. Immunitätsforsch., July, 1935, lxxxv, 254.*—(*M. B. L.*)

Blood Cultures by Loewenstein Technique.—For five years at the Sea View Hospital in New York the Loewenstein method of finding tubercle bacilli in the blood-stream has been tried in all of its variations, with the result that 911 specimens of blood from 422 tuberculous persons showed macroscopic positive cultures in 6, or 1.4 per cent, and microscopic positive cultures in 55, or 13 per cent. From the 6 macroscopic cultures tubercle bacilli could be readily grown by subculture and disseminated tuberculosis in guinea pigs produced. Since this was impossible in the 55 microscopic positive cultures they can only be considered as doubtful positive results. In 12 other instances, smooth glistening chromogenic colonies of acid-fast bacilli grew. These proved to be nonpathogenic saprophytic contaminants. Their shape and staining characteristics do not differentiate them from tubercle bacilli; therefore, subculture and virulence tests must be done. Since there are no guiding signals as to when the showers take place and the number of tubercle bacilli in the blood-stream is so small (only one or two colonies were found in 5 to 10 cc. of blood), many repeated blood cultures are necessary to demonstrate them. Of the 6 positive cultures obtained two were from the umbilical cord and heart's blood of a premature baby who died three hours after birth with no evidence of tuberculosis. The placenta had a tuberculous area 2 cm. in diameter. The mother died of tuberculosis 18 hours after childbirth. Two other positive cultures were obtained from 9-months-old infants having pulmonary and generalized miliary tuberculosis. The other two were from adults with far-advanced tuberculosis. One was critically ill, having both pulmonary and intestinal tuberculosis. In the second adult case, the positive culture was obtained immediately after the first stage (5 ribs) of thoracoplasty. This patient had a pneumothorax on the contralateral side. The postoperative course was uneventful. There still exists a disparity between the results of Loewenstein and the others and the explanation probably lies in Loewenstein's looser definition of a positive culture and his conception of a control.—*The Detection of Tubercle Bacilli in the Blood Stream by the Loewenstein Technique and an Analysis of Loewenstein's Investigations, M. Siegel, Am. J. M. Sc., September, 1935, cxc, 345.*—(*E. M. J.*)

Tuberculin Test in Tuberculosis of Eye.—The intracutaneous tuberculin test has been widely used in the diagnosis of ocular tuberculosis, but opinions differ as to its value. The present study represents an attempt to correlate the results of tuberculin tests with the preoperative clinical diagnosis and with the postoperative pathological diagnosis in 50 cases of uveitis which have required enucleation of the affected eye. The questions of primary interest were: *1:* Do patients with proved active ocular tuberculosis always give a positive Mantoux test? *2:* What diagnostic significance is to be given to the varying degrees of reactivity discovered by the Mantoux test? *3:* In the proper study of inflammatory intraocular disease, does a negative Mantoux test often lead to a false diagnosis? *4:* Does a positive test often lead to a false diagnosis? In answer to the first three questions the following was noted: Among 10 cases of proved ocular tuberculosis, 6 reacted to 1/1000 mgm. of tuberculin, while only one failed to react to all dilutions below 1 mgm. Extreme sensitivity to tuberculin is, therefore, of definite diagnostic significance in these cases. Moderate sensitivity to tuberculin, producing reactions to 1/10 or 1/100 mgm., is no more common in cases of proved ocular tuberculosis than in cases of nontuberculous uveitis. Finally, an essentially negative reaction to tuberculin can occur even in patients with active ocular tuberculosis. Of the 11 cases showing extreme sensitiveness to tuberculin, two were wrongly diagnosed clinically, one case being called tuberculous when it was not and one *vice versa*. In all

cases the significance of the intracutaneous tuberculin test can only be evaluated when weighed in relation to all other clinical data.—*Value of the Intracutaneous Tuberculin Test in the Diagnosis of Ocular Tuberculosis, J. S. Friedenwald and J. Dessoff, Bull. Johns Hopkins Hospital, September, 1935, lvii, 147.—(J. S. W.)*

Tuberculosis of Mouth.—Tuberculosis may produce a lesion clinically similar to cancer but its treatment and prognosis is totally different. Tuberculosis of the mouth is almost always secondary to pulmonary disease. Points of diagnostic value are the superficial nature of the ulceration, the multiple foci, and the pin-head yellowish spots. The ulceration is more irregular than carcinoma, with small tongue-like areas radiating out into the surrounding tissue. The surrounding area shows a peculiar puffiness that is soft on palpation in contrast to the hard induration of carcinoma. The ulceration is often crossed by fissures, usually absent in carcinoma. The area may or may not be tender. Enlargement of the regional lymph nodes is usually due to secondary infection. Ten cases are described. Tuberculosis should be considered in cases of chronic ulceration of the mouth. Errors in diagnosis most often occur where the pulmonary disease produces few or no symptoms. Radiation therapy may be of some value in treatment.—*Tuberculosis of the Mouth, B. L. Feuerstein, Am. J. Surg., August, 1935, xxix, 313.—(L. F. B.)*

Anorectal Tuberculosis.—The authors present a study based upon 106 cases of nontuberculous suppurative lesions of the rectum and 71 cases of proved or probable instances of anorectal tuberculosis. They conclude that, in from 3 to 5 per cent of patients with pulmonary tuberculosis, anorectal complications develop and that these are generally tuberculous in character. The age-incidence of the patients with anorectal tuberculosis follows the general age-incidence of tuberculosis. Anorectal tuberculosis generally occurs as a complication of pulmonary tuberculosis. Primary anorectal tuberculosis is extremely rare. The symptoms are variable and depend on the extent and character of the lesion. In the diagnosis of anorectal tuberculosis, injections of suspensions prepared from pus, scrapings or tissue injected into guinea pigs, or inoculated into suitable culture media represent the most reliable tests. Such material from 31 active cases and 18 arrested cases of pulmonary tuberculosis yielded the tubercle bacillus in 77 and 55 per cent of the cases, respectively. It is the authors' opinion, however, that over 90 per cent of open suppurative lesions of the rectum in patients with pulmonary tuberculosis are tuberculous or become so in character. Therapeutic nihilism and medical management of the anorectal lesions in the tuberculous are incapable of removing either the lesions or the symptoms arising from them. Surgical treatment employing the cautery and sacral anaesthesia is indicated. Of such operations on 71 patients with proved and probable anorectal tuberculosis, including sinus, abscess and fistula, in 70 patients the clinical results were most gratifying. There occurred a complete healing of the local wound in from six to twelve weeks.—*Anorectal Tuberculosis, A. J. Chisholm and H. Gauss, J. Am. M. Ass., June 8, 1935, civ, 2067.—(G. L. L.)*

Treatment of Tuberculous Empyema.—There is no definite treatment for tuberculous empyema. The therapy varies according to the clinical types. In the uncomplicated cases, drainage by thoracic puncture and insufflation of air to maintain lung collapse give the best results. Oleothorax offers no advantage and may bring about perforation of the lung through increased intrathoracic pressure. Irrigation of the pleura is no more efficacious than simple drainage through thoracic puncture. Sanocrysin and methylic antigen injected into the pleural space, as recommended by others, have not been found useful. In tuberculous empyema complicated by other infections, pleural puncture, pleural irrigations, intrapleural injections of medicinal substances and disinfecting oleothorax, have been tried without success. Extrapleural thoracoplasty is the only treatment that is really effective. The patient may be subjected to medical treatment based mainly on pleural irrigations for two or three months, and if this fails the extrapleural thoracoplasty should be resorted to. The pus must be evacuated before undertaking the thoracoplasty, as it may bring about serious complications, such as mediastinal displacement and drainage into the bronchial system. Pachypleuritis and parietal infection interfere with the success of the operation. When such conditions exist, more extensive interventions, such as pleurothoracectomy, become necessary. In conclusion, medical treatment alone for infected tuberculous empyema leads to failure. In certain cases it may be tried for two or three months, but no longer, since undue delay may cause the surgical treatment to fail. Ample extrapleural thoracoplasty, practised at the proper time, is the only really efficacious measure, but it may fail where there is intense pachy-

pleuritis or parietal infection.—*El Tratamiento del Empiema Tuberculoso, A. Sarno, J. Sciutto and R. Plaggio, Arch. Uruguayos Med., Cir. & Especial., May, 1935, iv, 553.*—(*J. R. P.*)

Cardiac Infarction from Tuberculous Material.—A white male, aged 40, suffering from pulmonary tuberculosis, died suddenly. He was an ambulant patient up to the day of his death. At autopsy, an extensive pulmonary tuberculosis was found, also a generalized miliary extension of the disease. The finding of main interest was the presence of a recent infarction of the lateral and upper portion of the left ventricle of the heart. The histopathological picture of the infarcted heart muscle was that of a noninfectious lesion. In the epicardium a small branch of the coronary artery lying over the infarcted area was found to be plugged by a bit of caseous material in which tubercle bacilli were easily found. This finding is an interesting example of haematogenous dissemination of tuberculous material.—*Early Cardiac Infarction Caused by an Embolus of Caseous Tuberculous Material, E. M. Medlar, Am. J. Path., July, 1935, xi, 707.*—(*J. S. W.*)

Associated Intrathoracic and Bone Tuberculosis.—Opinions differ regarding the frequency of the association of intrathoracic lesions with bone-and-joint tuberculosis. This study is based on 100 orthopaedic cases at the Peiping Union Medical College. Of the 100 patients, 52 were female and 48 male. All but one were Chinese. The youngest was 9 years old and the oldest 56, the average being 22.66 years. Onset of disease occurred during the second decade in 41 per cent of the cases, and during the third decade in 37 per cent, with rapid decline after the fourth decade. Sixty-six per cent of the cases had draining sinuses. Chest X-rays available in 88 cases were classified without particular reference to degree of activity or extent of the chest lesion. Type I had normal chests or only pleural thickening: type II, hilum tuberculosis; type III, juvenile tuberculosis with involvement of adjacent parenchyma; type IV, moderately advanced tuberculosis; and type V, advanced tuberculosis. Of 79 cases with single surgical lesions, 15 were classified as type I; 25, type II; 22, type III; 16, type IV; and 1, type V. Classification of 21 cases with multiple surgical lesions was, respectively, 7, 6, 5, 3 and 0. In 50 cases the bone lesions were in the lower extremity and in the upper extremity in 18. Of the 100 cases studied, 47 had definite pulmonary involvement and 78 showed intrathoracic lesions of varying degree. More attention should be paid to intrathoracic infections as the probable primary foci of so called surgical tuberculosis. A multiplicity of surgical lesions does not necessarily bear any direct relationship to the extent of the existing pulmonary infection.—*The Association of Intrathoracic Lesions with Bone and Joint Tuberculosis, C. M. Meng and H. I. Chen, J. Bone & Jt. Surg., July, 1935, xvii, 552.*—(*L. F. B.*)

Unusual Site of Bone Tuberculosis.—Tuberculosis is uncommonly found in the diaphysis of a long bone and also in the flat bones of the skull. Following injury to the right temporal region a five-year-old colored child developed, in course of four years, fluctuant tumors and draining sinuses in the right temporal, right parietal, left frontal and left zygomatic regions; over the manubrium and first left metatarsophalangeal joint; tuberculous lesions of the 5th lumbar vertebra and lower one-third of the right humerus. Chest roentgenogram showed tracheobronchial and parenchymal childhood type of tuberculosis. All bony lesions also showed typical signs of tuberculosis, and pus from left metatarsophalangeal joint showed tubercle bacilli. An intracutaneous injection of 1.0 mgm. of O.T. gave a positive reaction. Chest and other lesions show healing by the time the spine and humerus showed disease.—*A Case of Tuberculosis of the Humeral Diaphysis and the Cranial Vault, L. D. Van Antwerp, Am. J. Roentgenol., July, 1935, xxxiv, 50.*—(*E. M. J.*)

Onset of Skeletal Tuberculosis.—Tuberculosis of the skeleton became manifest in 50 per cent of 113 cases during the first year following erythema nodosum, in more than three-fourths of all cases within the first two years, and in practically all cases during the first three years. The erythematous eruption is in all probability consistent with the primary manifestations of tuberculosis. Tuberculosis of the skeleton usually occurs between the 6th and 30th years of age, showing some slight increase between the 16th and 25th years. The increased frequency of tuberculosis of the bones and joints in these years means a higher rate of primary infection rather than a higher susceptibility to this type of tuberculous involvement.—*Über den Zeitpunkt des Auftretens der Skelettuberkulose, A. Wallgren and A. Lundblom, Die Tuberkulose, June 10, 1935, 164.*—(*F. G. K.*)

Tuberculous Cysts of Knee-Joint.—Cases of *osteitis tuberculosa multiplex cystica* of the hands, feet, shoulders and elbows have

been reported but none in the knees. Two proved cases and one nontuberculous cystic condition of the knee are reported. The patients were healthy except for the gonitis and were between 32 and 41 years of age. The first case was of over five and one-half years' duration, in which time the patient worked 5 years. A diagnosis of *osteitis cystica fibrosa* was made 18 months after onset. At this time there was no erosion of the joint surface, no demineralization of the adjacent bone and no evidence of marginal erosion except at the inner margin of the articular surface of the tibia. This was proved by later incision to be a smooth-walled cyst. There was no evidence of tuberculosis until after this cyst was opened and drained 5 years after onset, and tuberculosis was not proved until microscopic examination of the resected knee was made 6 months later. The multiple cysts adjacent to the knee had the appearance roentgenologically and macroscopically of an *osteitis fibrosa cystica*. The second case was of 4 years' duration prior to surgery. The cysts in the patella, tibia and femur presented firm smooth walls and no roentgenological or macroscopic evidence of tuberculosis. During 18 months successive ruptures of the cyst into the joint were treated by curettement before resection of the knee was done and microscopic evidence of tuberculosis found. The contrast case had a patellar injury 4 years before a strain caused the rupture of a patellar cyst into the joint. This was followed by pain, stiffness, some diminution of motion and swelling in the suprapatellar pouch. Curettement of the cyst and removal of the inflammatory tissue resulted in complete recovery 6 years ago. The cyst which was limited to the patella did not differ roentgenologically or macroscopically from those in the other two cases. With all the evidence, including X-ray, at hand, the preoperative diagnosis of tuberculosis of the knee is often impossible. Tuberculosis may be present with an entirely negative X-ray. On the other hand, all of the usual findings characteristic of typical joint tuberculosis may occur in nontuberculous lesions. The diffuse demineralization of the adjacent bone may be present in any inflammatory lesion that involves the synovial membrane and may be as great as that seen in advanced tuberculosis. Invasion and bone destruction of the epiphysis may present findings not distinguishable from syphilis or other joint infections. The smooth-walled cysts simulating osteitis fibrosa cystica must also be considered a definite manifestation of joint tuberculosis. However, these cysts are not pathognomonic. Discovery of such cysts in a chronic gonitis should indicate an early biopsy.—*Tuberculous Cysts of the Knee Joint, A. E. Elliott, Am. J. Roentgenol., August, 1935, xxxiv, 209.*—(*E. M. J.*)

Multiple Cystic Tuberculous Osteitis.—A 35-year-old Chinese male, discharged six months before with an apparently arrested pulmonary tuberculosis, returned for examination complaining of slightly aching pain in the left great toe in the region of the metatarsal-phalangeal joint. On physical examination and X-ray, nothing abnormal was revealed. Fifteen months later, the patient noted slight puffiness and dusky redness over the joint mentioned. The discomfort at this time was still very slight, but from then on a greatly increasing hypermotility of the joint developed. Nineteen months after his initial symptoms he again presented himself for examination, and at this time an X-ray revealed extensive cystic erosion and a moth-eaten appearance of the adjacent ends of the metatarsal and first phalanx of the left great toe. Objectively, the region of this joint was cyanotic, warm and slightly swollen, the swelling seeming to be fluctuating but not tense. There was marked hypermotility of the joint and crepitus, but no pain on manipulation. There was no associated lymphadenitis. The man's pulmonary tuberculosis showed no evidence of activation, the Wassermann was negative, blood count essentially normal, temperature rarely to 99°, and general condition excellent. A curettage was performed, no pus was found, but a considerable amount of necrotic bone and granulation tissue was removed from the articular ends of the bones. The wound rapidly healed and closed completely. Microscopic sections of the curetted material revealed granulation tissue with immature tubercles and a few giant cells, acid-fast organisms were found in microscopic sections stained for acid-fasts, and a guinea pig, inoculated with the material from the bones, died one month following inoculation with a small abscess containing cheesy material and many acid-fast bacilli at the point of inoculation. The diagnosis of multiple cystic tuberculous osteitis was made. This disease is comparatively rare and this case is apparently only the second instance in which a joint was invaded. The case resembled others reported in its insidious onset and slow course, remarkable absence of even moderate pain, peculiar cystic degeneration on X-ray examination, the histological picture, and the occurrence in the small bones of the foot. The unusual features of the case were (1) the fact that a joint was involved, (2) there were no lupoid or sarcoid changes of the skin, and (3) tubercle bacilli were demon-

strated in the tissues.—*A Case of Osteitis Tuberculosa Multiplex Cystica, D. R. Chisholm, Canad. M. A. J., March, 1935, xxxii, 302.*—(*A. E. M.*)

Surgical Treatment of Bone and Joint Tuberculosis.—In bone-and-joint disease we are dealing with metastases from an old persistent focus. The disease is extremely chronic. An early lesion begins as a circumscribed focus and may be present weeks or years without clinical manifestations. Any form of treatment should be reasonably sure of healing the lesion as soon as possible, and preserve the best possible function, and its cost should not be prohibitive. These requirements can be met best by radical surgical extirpation of the tuberculous focus. Eradication can be done in the early or late stage. About 30 per cent of all cases are suitable for extirpation. It can be done at a later stage with certain precautions and it is often possible to restore useful motion. Resection, done late in the disease, to eradicate disease with loss of articular function, is justified only in adults. Arthrodesis may be included with resection, when it serves to cure the tuberculosis, but is fundamentally unsatisfactory. Osteotomy serves only to improve function. In the case of a single lesion of a small bone, the entire bone with the adjacent synovia should be removed. There is as yet no safe and sure operation for tuberculosis of a vertebral body. In diaphyseal lesions radical removal of tuberculous tissue may be done. Radical removal should be done on the cranial vault. Lesions in the metaphysis or apophysis may be removed without disturbance of function. When it is necessary to open a joint to reach a lesion, there should be complete removal of the diseased joint-capsule. A purely synovial tuberculosis should be treated by synovectomy. Of 276 cases, there were 92 operations on 68 patients with 110 circumscribed lesions. Since 1919 there have been only 3 deaths, and only 2 cases in which healing did not result. In more than one-fourth of the cases extirpation was possible. Forty-one cases were early and 60 cases late. There have been no recurrences. It should be emphasized that radical operation should be performed only in cases of circumscribed, well-demarcated lesions, and as early as possible.—*The Radical Operative Treatment of Bone and Joint Tuberculosis, P. J. Erlacher, J. Bone & Jt. Surg., July, 1935, xvii, 536.*—(*L. F. B.*)

Blood-Pressure in Renal Tuberculosis.—The 346 unselected proved cases of renal tuberculosis admitted to the Mayo clinic between 1925 and 1934, inclusive, showed no more hypertension or hypotension than was found in a group of 2,870 normal adult patients studied by members of the same clinic. In each of the 346 cases nephrectomy was done and the lesion was found to be active and usually the involved kidney was almost completely destroyed. The lesion was in the left kidney in 167 cases; the right in 169 cases; and in both in 10 cases. Acid-fast bacilli were isolated from the urine in 74.5 per cent of the cases. Renal-function tests in 245 cases showed only 27 to have more than 40 mgm. urea per 100 cc. of blood. About 76 per cent of the group had a systolic blood-pressure reading between 100 and 139 mm. mercury; 2 per cent had less than 100; and 22 per cent 140 or higher. The lowest reading was 86 and the highest 210. The mean systolic value for the whole group was 126 mm. There was no essential sex variation; 77.7 per cent of the 229 males and 74.4 per cent of the 117 females had systolic pressures from 100 to 139 mm. mercury.—*Variations in Blood Pressure in Renal Tuberculosis, C. G. Morlock and B. T. Horton, Am. J. M. Sc., June, 1935, clxxxix, 803.*—(*E. M. J.*)

Associated Renal Tuberculosis and Nephrolithiasis.—The distinction between simple calcification and true stone-formation in tuberculous kidneys is of both diagnostic and prognostic importance. Calcification is found in about 7 per cent of all cases of renal tuberculosis, whereas, in approximately 1.8 per cent of all cases of renal tuberculosis there is true calculus-formation. Although this is a small number, the possible occurrence of such an association should be constantly kept in mind. It is important, therefore, to perform routinely at least plain film roentgenographic examination in all cases of renal tuberculosis. Calcification in renal tuberculosis may take the form of (1) multiple scattered small shadows, either multiple punctate areas or single, elongated, irregular faint streaks; (2) single or several isolated shadows, which are easily confused with stone, which may be of irregular outline, with fainter shadow than that of stone, and varying in size, or of very irregular consistence and outline, resembling filigree work, or definite shadows with a density and contour suggestive of stone; and (3) large, regular, rounded shadows of variable density in their various portions. True calculus-formation, in a tuberculous kidney, does not differ in intensity or contour from that observed in nontuberculous cases. If the calculus proves to be composed of oxalates or urates, its formation was probably independent of the tuberculosis, whereas,

in the case of calcium-carbonate or calcium-phosphate calculi, the origin is secondary to the tuberculosis. Five cases, all instances of true calculus-formation in tuberculous kidneys, are reported, in addition to an analysis of 35 cases reported in the literature since 1920. In 26 of these 40 cases, the calculus and the tuberculosis were on the same side, and in only one instance was the correct diagnosis made before operation. The importance of recognizing the true state of affairs derives from the fact that there is increased danger of a persistent fistula following pyelotomy, and the chances of recurrence of calculi are greatly increased. It is therefore important that every case of renal or ureteral calculus be examined for the possible coexistence of renal tuberculosis. In 5 cases a unilateral tuberculosis was associated with true calculus-formation of the opposite kidney. It is important, in this situation, to make, first, every effort to deliver the calculus by nonoperative or operative means, before the nephrectomy, to avoid the possibility of a postoperative calculus anuria. In 4 instances there existed bilateral renal or ureteral calculi and a unilateral tuberculosis. The best procedure is, probably, the removal of the calculus from the better side before the nephrectomy. In 4 instances bilateral renal tuberculosis was associated with the bilateral lithiasis. These cases are of little practical clinical interest except from the standpoint of diagnosis.—*Renal Tuberculosis and Nephrolithiasis as Associated Disease, D. N. Eisendrath, S. G. O., January, 1935, lx, 77.*—(*A. E. M.*)

Primary Skin Tuberculosis.—The skin serves as the portal of entry of a tuberculous infection in 0.14 per cent of cases. This occurs usually at a site of injury, or, rarely, a simple infection. The most common type of primary skin tuberculosis is that reported following circumcision, the wound having become infected through sucking by the operator. Primary infection of the eye is much rarer. The authors report a case of primary tuberculosis of the lower lid in a 4 months old infant accompanied by regional adenitis (submaxillary glands), the point of entrance probably impetigo. The lesion was an ulcerated infiltration, biopsy revealing characteristic tuberculous granulation tissue, caseation, and acid-fast bacilli. The tuberculin reaction became positive a few days after the lesion was first observed. Primary tuberculosis of the skin is seen as a rule in infants and young children. The mortality is high, especially when the site is a circumcision wound.—*Tuberkulöser Primäraffekt des Augenlides, Popovici-Lupa, Vasile Petrescu-Coman, and C. Vasilescu, Monat. für Kinderh., Sept., 1935, lxiii, 359.*—(*M. D.*)

Actinotherapy of Lupus and Cervical Adenitis.—A previous paper dealt with 273 patients treated up to the end of 1930. By the end of 1933 the total number had reached 439. *Technique and methods:* These are based on those in long use at the London Hospital with the carbon-arc and mercury-vapor lamps. The patients are treated in groups selected according to age and sex, usually thrice weekly, occasionally more or less often. They sit, unclothed except for a loin-cloth and eye protection, and receive general exposures for increasing periods, beginning with fifteen minutes front and back for the carbon-arc and one minute for the mercury-vapor. With the carbon-arc the time is increased fifteeen minutes back and front at weekly intervals up to two and one-half hours, or with the mercury-vapor lamp, by one minute front and back weekly up to twenty minutes. In cases of adenitis without softening, local exposures at 12 inches distance may be added. The lymph node may shrink or it may soften; in the latter case it is aspirated. In cases of lupus, the local application of the Kromayer water-cooled mercury-vapor lamp is used in place of the Finsen lamp, after preliminary treatment with a creosote-salicylic-acid plaster, except to the face. Acid-nitrate of mercury is used for small residues. Minor surgical measures, such as aspiration of abscesses and division of keloid bands, are used locally where indicated. With the carbon-arc lamps a long flame is used, and, at first, Siemens-A carbons but later British "Ship" carbons. Pigmentation, evidence of light effect, occurs especially in the dark-skinned; when too deep, exposures are omitted until it wears away. The average periods of light treatment given patients discharged as quiescent were for lupus and skin 10¾ months, lymph nodes with softening 6¼ months, and without softening 7¼ months. For working patients, two exposures per week were about the average. *Results:* Of a total of 439 individuals receiving artificial-light therapy at the Eccles Dispensary between December 1, 1927, and the end of 1933, 281 were discharged quiescent and apparently well, including 91 per cent of cases of lupus and scrofuloderma and 98 per cent of adenitis which completed a course of treatment. Of 152 patients discharged quiescent and apparently well up to the end of 1930, and under supervision for periods between three and six years, 82 per cent remain in satisfactory condition, 96 per cent of the adenitis cases remaining quiescent or arrested. The

results of the lupus cases, while good, were not quite so good as with the Finsen lamp. It is important to know whether pulmonary tuberculosis coexists, as in such patients caution in light baths is necessary. On the other hand, for the patients with only adenitis demonstrable, residential institutional treatment appears to be unnecessary and by itself is more costly and gives inferior results to those at the light clinic. The results also are much superior to those obtained with surgical measures, except in the case of rare isolated lymph nodes.—*Actinotherapy at a Tuberculosis Dispensary, G. Jessel, Tubercle, February, 1935, xvi, 193.*—(*A. P.*)

Erythema Nodosum.—The tuberculin reaction is positive in 96 to 98 per cent of children with erythema nodosum. However, the clinical syndrome undoubtedly may occur as a consequence of cow-pox vaccination, "anginas," grippe, influenza, and particularly scarlet fever, in children who are repeatedly negative to large doses of tuberculin and in whom no roentgenological or clinical evidence of tuberculosis is detectable. A study of the cases that have been reported in scarlet fever indicates that erythema nodosum usually occurs during the third or fourth week after the onset, about the same time that other allergic complications (nephritis, synovitis, etc.) are apt to occur.—*Erythema Nodosum bei Scharlach, E. Moro, Ztschr. Kinderhk., July, 1935, lvii, 321.*—(*M. D.*)

Erythema Nodosum.—Among the 650 cases of erythema nodosum in the Children's Hospital of Gothenborg, Scandinavia, seen in the past 12 years, 97 per cent were children with tuberculous infection. In the other 18 cases, no clinical, X-ray or allergic evidence of tuberculosis was present. Of these one child was of particular interest. Her first attack of erythema nodosum was associated with upper respiratory infection with a negative intracutaneous test (to 10 mgm.) and negative X-ray findings. However, during a second attack of erythema nodosum 18 months later, the tuberculin reaction was positive (0.1 mgm.) and the X-ray revealed a primary pulmonary tuberculosis. This case reveals strikingly the nonspecific nature of erythema nodosum as a peculiar allergic reaction to infection.—*Erythèmes noueux avec réaction négative a la tuberculine, N. Landorf, Rev. Franç. Péd., 1935, xi, 157.*—(*M. D.*)

Postprimary *Erythema Nodosum Tuberculosum*.—The frequency with which erythema nodosum appears as a primary symptom in children varies according to the age. Of children 1 to 5 years old with erythema nodosum, about 90 per cent gave X-ray evidence of primary tuberculous infection, whereas in the children from 10 to 15 only 56 per cent exhibited evidence of primary tuberculosis. The author considers it very probable that a postprimary erythema nodosum can be caused by a massive exogenous new infection. It is noteworthy, however, that only 2 out of 14 cases of postprimary infection were associated with an aggravation of the tuberculous process. In cases of erythema nodosum, negative to tuberculin, a recurrence was common, whereas in tuberculin-positive cases, a recurrence was very unusual. The postprimary erythema nodosum runs a much shorter course than does the primary form, and the prognostic outlook is much brighter in regard to the probability of simultaneous clinical tuberculous disease. Fourteen cases were discussed.—*Postprimary Erythema Nodosum Tuberculosum, A. Wallgren, Acta Tuberc. Scandin., 1935, fasc. I, ix, 1.*—(*F. B. S.*)

Chronic Disseminated Pulmonary Tuberculosis with Erythema Nodosum.—The case here reported is of a type recently reviewed by the *British Medical Journal* and of great interest in view of the controversial interpretation of such lesions. The original source of infection, a case of "tertiary" pulmonary tuberculosis, is also known. *Case:* A female of 29 years was seen after two weeks' illness with characteristic lesions of erythema nodosum on the extensor surfaces of both legs. She had until very recently slept with her sister, aged 26, who had been ill for six months and showed pulmonary tuberculosis involving the right upper lobe and with positive sputum. The patient in question showed few physical signs but roentgenographic findings of acute disseminated pulmonary involvement resembling pneumonoconiosis. She had no cough or sputum but her general condition was poor. *Discussion:* Comparison of the two films of the sisters (not reproduced) is characteristic of the secondary and tertiary phases of Ranke. The type of disease apparently does not depend on the age of the patient but the age of the infection. The onset of the primary infection is presumed to be recent from the history. The only "allergic" manifestation of illness appeared to be the erythema nodosum. Seven months later the patient was working and appeared well, although the roentgenographic appearance would have suggested a bad prognosis and is still unaltered. It is urged that every patient with erythema

nodosum have chest X-ray films taken.—*A Case of Chronic Disseminated Pulmonary Tuberculosis with Erythema Nodosum, S. Deaner, British M. J., February 23, 1935, no. 3868, 357.*—(*A. P.*)

Cerebrospinal Fluid in Tuberculous Meningitis.—In 8 cases of tuberculous meningitis, the majority of the cells within the cerebrospinal fluid were segmented neutrophiles rather than lymphocytes. The increase of segmented cells seems to pursue a certain rule which can be of prognostic value. Marked increase was always followed by a fatal course of the disease. The selective destruction of the segmented cells in the time between the puncture and the staining is related to a specific agent, tryptophan, or other protein derivative or a peptolytic ferment, in tuberculous meningitis. This idea, until now not proved, seems to be consistent with the formation of thrombin from the thrombogen in the presence of thrombokinasis. Sometimes it is possible to differentiate all the occurring forms of corpuscular elements; cells of epithelial or tissue character might be introduced during the spinal puncture. Besides the various well-characterized cells of the lyeloic, lymphatic, and histiocytic system, there were found in all fluids cells which are refractory to methyl-green-pyronin; these cells failed to show any similarity to cell forms in the blood and spinal fluid, as they are known up to date. Their number seldom was over 0.3 to 0.4 per cent; the size was between that of large and small lymphocytes; and the nucleus showed a structure of chromatin presenting basophilic granules, insoluble in water. The author gives no further explanation of this type of cells.—*Über die Zellen im Liquor cerebrospinalis bei der Meningitis tuberculosa, H. E. Wedemeyer, Klin. Wchnschr., June 15, 1935, xiv, 858.*—(*F. G. K.*)

X-ray Treatment of Tuberculous Meningitis.—In the authors' 25 cases, X-ray had no effect on the course of tuberculous meningitis, all terminating fatally. This is at variance with the results of von Bokay (1932), who reported 5 recoveries among 17 cases treated in this way. It is conceivable that the method may be successful in cases with little or no generalized tuberculosis, or in which the organism is of low virulence. Treatment should be started early in the course of the disease.—*Sur le traitement de la méningite tuberculeuse par les rayons X, J. S. Weiner, E. D. Doubow, M. G. Finkelstein and A. A. Schneierson, Arch. Méd. Enf., September, 1935, xxxviii, 537.*—(*M. D.*)

Afebrile Miliary Tuberculosis.—Afebrile miliary tuberculosis is commonest between the ages of 20 and 30. It occurs more frequently in women than in men. In 53 cases, there were 34 women, 11 men and 8 children. The symptoms may be very insignificant; but, as a rule, there are asthenia, anaemia, loss of weight, dry cough, some dyspnoea, with, at times, cyanosis, and haemoptysis. When there is expectoration, it is scanty and without tubercle bacilli. The tuberculin test may be negative. The diagnosis depends mainly on the X-ray picture of the chest. The physical examination may reveal rough respiration and sibilant or subcrepitant râles. The fluoroscopic examination is almost always irrelevant, and may be entirely negative. The X-ray picture of the chest reveals miliary nodules which vary in size among themselves, and occur in small groups. The whole pulmonary field appears grayish, and the nodules are less dark than those of the classical miliary tuberculosis. There is a fine network of fibrous tissue, which persists in cases that have recovered. Afebrile miliary tuberculosis may be followed by recovery; it may last for several years; or it may evolve into tuberculous meningitis, general miliary tuberculosis, fibrocaseous tuberculosis, or into a chronic fibrous tuberculosis. Fibrous miliary nodules predominate; but the exudative and follicular micronodules are also found. A case is presented, in a young man of 21, finally evolving into generalized miliary tuberculosis. Tubercle bacilli were found in the feces and later in the sputum. Autopsy findings were those of miliary tuberculosis, extensively disseminated throughout the body.—*Tuberculosis Miliar (Granulia) Fria, Estudio Critico y Anatomo Clinico, C. P. Waldrop, D. F. Luna and L. P. Repetti, Rev. Asoc. Med. Argentina, February, 1935, ii, 261.*—(*J. R. P.*)

Thoracic Surgery and Tuberculosis Sanatoria.—There is now general agreement among phthisiologists that the treatment of active pulmonary tuberculosis by the customary hygienic-dietetic routine so long observed by our sanatoria has serious limitations, especially in the "hospital type" of patient. The London County Council Public Health Committee found in 1932 that 76 per cent of 3,000 phthisical patients discharged in 1927 after sanatorium treatment were dead. Therefore collapse therapy has lately been pursued with vigor, in some cases more enthusiastic than informed, as only a small proportion are really suitable and its injudicious use further darkens the already gloomy prospect of these patients.

The advent and increasing use of artificial pneumothorax have doubtless been epoch-making events in the history of tuberculosis therapy, but experience indicates two considerable groups in which further problems arise; namely, (1) those impossible to so treat because of adhesions, and (2) those in which serious complications such as tuberculous empyema occur. The more radical surgical methods were a logical sequence and now phrenic-nerve and thoracoplastic operations are included in the sphere of the chest surgeon and are added to the methods at our disposal. Formerly patients were sent from the sanatorium to a specially equipped hospital for such special surgical measures, but recently the sanatorium itself has come to be regarded as a centre in which such procedures can be undertaken. Sauerbruch and Brauer in Germany were pioneers in this field, closely followed by Key in Sweden, Bull in Norway, and Archibald in Canada. The recent work along these lines is well described by Morriston Davies, the Brompton Hospital Reports, and by Sellors, who has collected records of 3,500 cases of pulmonary tuberculosis subjected to thoracoplasty with an operative mortality of 6.5 per cent, 45 per cent being cured and returning to work and 25 per cent improved. The largest individual series, that of Nissen at the Brauer Clinic, 700, followed over an average of three years, showed over 40 per cent returned to active life. The surgical unit described in this paper is that at Preston Hall, England, and was built locally by industries manned by ex-patients in the Village Settlement. There is an operating theatre, an "acute" ward, and a block accommodating 41 patients, with a construction cost of about £4,200, or just over £ 100 per bed (about $500); the water, electricity and sewerage facilities, being close at hand, are not included. The equipment is slightly more elaborate than for general surgery and a special positive-pressure anaesthesia apparatus is available. The surgeon, Mr. O'Shaughnessy, has carried out some 80 operations and the tendency is toward a more selective type of operation, such as the type of upper thoracoplasty reintroduced by Graf. Apicolysis has been done in cases of localized disease of the upper lobe when the general condition has precluded more radical measures. Phrenicolapaxy, inducing a temporary rather than permanent diaphragmatic paralysis, has superseded phrenicoexairesis (Felix), which in turn had superseded phrenicectomy as practised by Sauerbruch and Stuertz. Drainage operations for empyema complicating artificial pneumothorax form another large group requiring radical surgery. And, also, it is possible to gradually extend the benefits of surgical collapse therapy to cases of bilateral disease, as Gravesen has done, although the cases must be very carefully selected. The patients themselves, at Preston Hall at least, have tended to be conservative in their outlook and the really extensive nature of many of the operations ought not to be minimized or concealed. Surgical collapse therapy is not likely to prove a success without some local tendency toward healing, and in the predominating exudative type of case it is actually dangerous. Ligation of the pulmonary vein may, however, be done. It demands a highly skilled technique, but involves less trauma. The authors foresee that there may soon develop a demand for surgical units in sanatoria and chest hospitals throughout the country. They are not in favor of too many such centres, but rather of centralizing this work in a few large units which can develop the necessary skilled personnel and efficiency. To attempt to repeat this process indiscriminately involves the risk of the entire surgical treatment of chest diseases falling into disrepute.—*A Surgical Unit in a Sanatorium, J. B. McDougall and N. D. Bardswell, Tubercle, March, 1935, xvi, 267.*—(*A. P.*)

Surgical Treatment of Pulmonary Tuberculosis.—An efficient artificial pneumothorax carries with it the possibility of a brilliant success, abolishing symptoms and camouflaging the presence of active disease until such time as it is healed. A partial collapse, because of adhesions, may be converted to a complete collapse by division of the adhesions or, if this is impracticable, the pneumothorax may be supplemented by phrenicectomy or thoracoplasty. Another group of complications comprises effusion, tuberculization of the pleura, empyema and bronchial or subcutaneous fistula. Considering these, it appears questionable that all early cases should receive pneumothorax. Except in certain cases with pleurisy and possibly those with superficial cavitation having a surrounding zone of consolidation, the time of onset of adhesions is usually unknown. Indications for pneumothorax are of necessity and of choice. In the former group are those cases with haemoptysis, pneumonic tuberculosis, exudative or mixed types that progress in spite of bed-rest or relapse under treatment and cases with single or multiple cavitation. In the second group are those cases with apical or subapical lesions of the exudative or mixed type, those more extensive, mixed or proliferative, with or without cavities having comparatively thin-walls. For many

of these, time may be saved by an initial period of bed-rest and later some form of plastic operation if necessary. For the division of adhesions the actual cautery is more used than diathermy. Gomenol with olive or paraffin oil is still on trial. It is of great benefit in pyothorax, but most uncertain in its effect in that it may be completely successful or valueless. Airtight siphon drainage of an empyema has been quite successful in certain cases. Oleothorax for replacement of artificial pneumothorax may come into greater favor, but is not to be advocated as an alternative to thoracoplasty. The oil should not be under pressure, the pressure being checked regularly during the first six months. Phrenic-nerve interruption should always be by division or crushing and not evulsion. It is indicated for its influence on the lung, on pleural lesions, on symptoms, and in conjunction with other operations. More suitable cases are found among the proliferative type of lesions, but may not be completely successful in all such cases. It may be done as an alternative to unilateral pneumothorax in cases of moderately localized proliferative lesions with or without small thin-walled cavities in the upper or lower lobe or as an alternative to bilateral pneumothorax. Phrenic-nerve interruption is of value to supplement an incomplete pneumothorax, to control the base when an obliterating pleuritis has started, at the termination of collapse treatment and in eradicating suspended cavities. It is doubtful if it has any effect on effusions. Preliminary to complete thoracoplasty it should be crushed only. The results from scalenotomy have been discouraging. The principle of thoracoplasty is generally recognized, but there is no unanimity as to technique. The immediate risks of thoracoplasty over those of pneumothorax are greater but, once accomplished, the efficiency and constancy of control are assets not attainable with artificial pneumothorax. The principle of using a solid body, such as paraffin, to maintain an extrapleural collapse is not sound, and apicolysis should never be considered as long as thoracoplasty is a fair risk. Experience has established the principles of these surgical measures and has proved that practically every combination of operation is possible for the treatment of bilateral disease in selected cases.—*General Principles of the Surgical Treatment of Pulmonary Tuberculosis, H. M. Davies, J. Thorac. Surg., December, 1935, v, 113.*—(*L. F. B.*)

Development of Surgical Treatment of Pulmonary Tuberculosis.—In 1696 Georgius Baglivi proposed healing phthisis by a transverse incision between the ribs reaching to the seat of the lesions. Sir Edward Barry, in 1727, advised incision and drainage, especially in cases with painful parietal adhesions. Bell and David, Gumprecht and Pouteau, advised opening cavities. In the following century thoracentesis and aspiration were introduced and James Carson, of Liverpool, induced pneumothorax experimentally in rabbits by the incision method. He attempted a similar procedure in two advanced phthisical patients, who came to autopsy and were found to have the pleura adherent. In 1909, Daus recalled this brillant pioneer work of Carson. Krimer, in 1830, did an exteriorization of a lobe on a dog and wished to do likewise in a patient with a lung abscess, but was persuaded by Walther to be content with incision to the pleura. Incision, thoracentesis, cauterization both actual and chemical, and aspiration, were carried on by Richter, Jaymes, Freteau, Richarand and others; the last-named resecting two ribs and part of the pleura of a man with a cancerous growth. This, in 1818, seems to be the first report of a rib-resection operation. Ramadge wrote a book, in 1839, on *Consumption Curable*, with a heading *Consumption Cured by Thoracentesis*. He did not, however, actually do a thoracentesis to collapse the lung. Horace Green, of New York, in 1854, passed a catheter into the trachea and bronchial tubes, the forerunner of bronchoscopy. From 1881 to 1885 much experimental work was carried on in Germany and Italy on extirpation of the lung in animals. Bloch was the first to try resection of a tuberculous lobe in a human patient. The woman died and Bloch committed suicide. Ruggi, Tuffier, Doyen and Lowson excised tuberculous lobes, but it has been shown that pulmonary tuberculosis, rarely localized, is not adapted for resection. *Collapse therapy:* A method was sought to attack the whole involvement present, and Forlanini in 1882 proposed treating pulmonary tuberculosis by artificial pneumothorax. Collapse therapy had a long period of preparation and development, and Caylay, in 1885, treated a case of severe haemoptysis by creating a pneumothorax by incision. A little later, Potain was treating recurrent pleural effusions by withdrawal and replacement by sterile air (1888) and Parker dealt similarly with certain cases of empyema. Forlanini's first case report was in 1895, although a note concerning his method had already appeared in the *Münchener mediziner Wochenschrift*, April 10, 1934. In 1898, John B. Murphy of Chicago reported 5 cases treated by pneumothorax, using a trocar and large amounts of nitrogen, repeating the

injections at long intervals. Lemke followed him with further reports in 1899. Forlanini, on the other hand, used the puncture method, injecting small amounts at frequent intervals, to cause a gradual collapse. In 1906, Brauer, of Marburg, took up the method energetically with the aid of his assistants (Mosheim, Graetz, Shingu, Bruns). He at first created a voluminous pneumothorax, like Murphy, but later he and Shingu followed Forlanini's procedure of frequent small refills. He created his pneumothorax by incision through the parietal pleura. Saugman, in Denmark, began the treatment in 1902, but not successfully until 1906. He added a manometer to the apparatus with great advantage in precision and safety. Later, Mjoen and Holmboe in Norway, Delprat in Holland, F. Dumarest in France, and Lillingston in England, adopted the technique. Samuel Robinson, at the Massachusetts General Hospital in Boston, visited Brauer's clinic, and was familiar with Murphy's and Forlanini's work. Together with Cleaveland Floyd, he started pneumothorax in 1909 in a tent ward of the hospital. Balboni learned the technique from him and in 1910 treated 8 cases in private practice. In 1912 Ascoli reported the first bilateral therapeutic pneumothorax cases. Other important advances were those of Jacobaeus with pleuropneumolysis, Sturz with phrenicotomy, and Bernou with oleothorax. Saugman has stressed the importance of attention to details and control of technique by skilled physicians. The success of artificial pneumothorax contributed directly to the advance in methods of extrapleural surgical collapse.—*The Development in the Treatment of Pulmonary Tuberculosis from 1696 to the Present Time, G. M. Balboni, New England J. M., May 30, 1935, ccxii, 1020.*—(*A. P.*)

Immobilization of Chest.—An attempt was made to compare the effect of unilateral phrenicectomy, multiple intercostal neurectomy, and splinting the ribs together with tapes and metal bands, upon tuberculosis in the guinea pig. Three months after right phrenicectomy the animals were injected in the right groin with human tubercle bacilli. Six animals developed sufficient pulmonary tuberculosis to warrant inclusion in the series. Eight weeks after inoculation, X-ray examination showed 2 animals to have a preponderance of lesions on the left side, and in 4 animals there was equal distribution. At necropsy, as each guinea pig died, 10 to 12 weeks after inoculation, 3 animals showed more lesions on the left side and 3 had equal distribution. Only 7 animals are included in the series upon which intercostal neurectomy was done. The 4th to the 12th right-sided nerves, inclusive, were resected. Of the 5 animals X-rayed 8 weeks after inoculation, one showed more disease on the right, one more on the left, and 3 had an equal distribution. At necropsy about 12 weeks after inoculation, one had more disease on the right, 4 had more on the left and 2 had equal distribution. Because of difficulty in applying soft metal bands to bind the ribs together, linen tape was used. This was sutured around the 13th rib and the tape divided lengthwise. Each half was wound around the 12th rib in opposite directions and so on, including the lower 6 or 7 ribs. As the tape was applied the ribs were drawn closely together. It was almost impossible to prevent infection of the wound. These animals were inoculated 3 to 5 months after operation and X-ray and postmortem examination made as in the preceding experiments. Only 6 animals survived the procedure. Of these, 3 showed more disease on the left side by X-ray, and 3 had equal distribution. At necropsy one had left-sided predominance and 5 had equal distribution. Of 6 control, unoperated, animals inoculated in the same way, all showed equal distribution by X-ray, and at necropsy 4 had equal distribution and in 2 the disease predominated on the right side. Phrenicectomy clearly aids in setting the lung at rest and enables it to combat disease. Multiple intercostal neurectomy should also be a useful adjunct in accomplishing the same purpose. Rib-splinting seems to be of value and warrants further investigation.—*Chest Immobilization in Pulmonary Tuberculosis, F. M. Foote and J. W. Spies, J. Thorac. Surg., June, 1935, iv, 492.*—(*L. F. B.*)

Choice of Procedure in Collapse Therapy.—The best opportunity to control tuberculosis is in the treatment of early minimal lesions, yet 80 per cent of patients are advanced when first seen. Since the practice of waiting a few months to see which way the disease will go does more to undermine the management of tuberculosis, we should begin immediately with the simplest procedure, and add others as soon as the first shows itself incapable of controlling the disease. There is no phase of the disease in which collapse therapy is not indicated except the terminal one. With early unilateral lesions, choice of procedure is often difficult to make. In early, soft, infiltrative lesions, moth-eaten cavities, and in productive lesions with small cavitations, phrenic operations are preferable. Phrenic crushing leaves no permanent loss of func-

tion but does not permit as much uniform rest and relaxation as phrenicectomy, and frequently diaphragmatic motion may be present some time before it may be discovered. Recrushing cannot be done indefinitely, each succeeding operation being more difficult, and occasionally little or no paralysis occurs after the second "recrush." In the early lesion without parenchymal destruction, crushing is advisable; with parenchymal destruction and cavitation, phrenicectomy is usually indicated. A phrenic operation should not be given and the patient left at bed-rest indefinitely but, if improvement of the lesion is not apparent in a few weeks, pneumothorax should be added. In patients with unilateral, rapidly spreading, soft lesions, or with multiple or large cavitation or extensive disease in acutely ill patients, tuberculous pneumonia in cases with productive lesions with large thick-walled cavities, pneumothorax should be instituted at once. In bilateral disease, it is desirable to begin with pneumothorax on the worst side and a phrenic operation on the contralateral side. If this is impossible, the reversed procedure, pneumothorax on one side and phrenic operation on the other, is preferable to bilateral pneumothorax because less hazardous and less burdensome to the patient. With extensive bilateral disease, bilateral pneumothorax, without phrenic surgery, should be begun early. When thoracoplasty is indicated, when cavitation is small in the contralateral lung, pneumothorax, in preference to phrenic surgery, should be instituted, to control the contralateral lesion before thoracoplasty is performed. When collapse of a cavity is prevented by adhesions, even after phrenic surgery and the use of positive pressure, the adhesions should be severed unless they are encountered during the collapse of a lung with multiple or large cavities which probably cannot function again. In these cases thoracoplasty is preferable. It is more important that cavities be closed by some procedure as soon as possible, rather than any set sequence of procedure be used. Thoracoplasty is usually necessary when cavities are not closed by the above procedure. Scaleniotomy is not generally accepted in spite of some optimistic reports. It appears that a limited Sauerbruch operation in multiple stages could be done with more rest and collapse than intercostal neurectomy. While extrapleural packs might be used in a few exceptional cases their principle is basically unsound. It does not appear necessary to wait until the ideal classical indications for thoracoplasty appear before operating, especially in cases in which large thin-walled cavities are left after most of the parenchymal infiltration has disappeared, and, while these patients are not always considered good risks, most of them do well. Bilateral thoracoplasty may be indicated occasionally in bilateral apical cavitation but, as yet, has not been necessary.—*The Choice of Procedure in Collapse Therapy, E. J. O'Brien, J. Thorac. Surg., December. 1935 v. 123.*—(*L. F. B.*)

Treatment of Pulmonary Cavities.—Ninety cases of tuberculosis with cavity among war veterans were recently analyzed. None had been subjected to surgery or been in the hospital less than one year. Frequent roentgenograms and careful examinations of the sputum were made. Eighty-six per cent had positive sputum. Thirty-two per cent of the cavities were exudative in type, 54 per cent productive, and 13 per cent fibrotic. The cavities varied in size from 1.5 to 8 cm. in diameter. Many that healed were large, one being 4.5 by 8 cm. Ninety-three per cent of the exudative, 80 per cent of productive, and 50 per cent of the fibrotic cavities were round or oval. Of the exudative cavities, 24 per cent had no definite walls, 55 per cent had thin walls, 21 per cent had apparently thick walls. Of the productive cavities, 50 per cent had thin walls and 40 per cent thick walls. Of the fibrotic cavities, 80 per cent had thick walls. Of all types of cavities 46.6 per cent healed. Of the 66 per cent of exudative cavities which healed, 95 per cent did so in one year, 58 per cent of these within the first six months. Of the 43 per cent of productive cavities which healed, 66 per cent did so within one year, and 14 per cent of these within the first six months. Two cases, or 17 per cent, of the fibrotic cavities healed. Seventy-five per cent of all the cases were observed from six months to five years and none showed reopening of the cavities. Cavities most likely to heal by bed rest are exudative cavities; productive cavities with thin walls; cavities not too near the periphery and in the upper half of the lung; cavities accompanied by but little infiltration; and cavities in which the lesion is retrogressing. About 30 per cent of the exudative and 55 per cent of the productive cavities will have shown no tendency to heal in 6 or 8 months and should be considered for surgical aid. In rapidly progressive cases surgical intervention should be promptly considered. Phrenic-nerve surgery is to be the first addition to bed-rest in exudative and productive cavities, and the number healed will be increased from 66 to 75 per cent of exudative and from 43 to 50 per cent of productive cavities. Pneumothorax, aided when advisable by intrapleural pneumolysis,

is the next recourse in these cases and in many older cavities which may have been seen for the first time. In two-thirds of the cases in which a satisfactory collapse is obtained obliterating pleuritis will discontinue the treatment prematurely. Thoracoplasty is to be used if the previously mentioned treatment is not successful, but not necessarily as a last resort to save life. Tuberculosis of the larynx, intestines, genitourinary tract or bones is no longer a contraindication unless too far advanced. Diabetes, syphilis, definite renal disease and cardiac insufficiency are the main contraindications. Extrapleural pneumolysis and intercostal neurectomy may be used to supplement the other surgical measures. Nearly all fibrotic cavities should have surgical treatment without much delay, but for all exudative and a large proportion of productive cavities conservative treatment, especially rest in bed, is most important.—*The Treatment of Pulmonary Cavities, L. H. Fales and E. A. Beaudet, Am. J. Roentgenol., May, 1935, xxx, 635.*—(*E. M. J.*)

Indications for Treatment of Tuberculous Cavities.—A cavity in a tuberculous lung is a source of danger and adds to the gravity of the prognosis. However, many cavities heal without collapse therapy. McMahon and Kerper (1933) found 27.7 per cent healed under simple medical treatment and that spontaneous closure occurred in 40 per cent of those not over 2x2 cm., but in only 6 per cent over 4x4 cm., and that such healing was twice as likely in right-sided and three times as likely in unilateral cases. It is more the type of disease than the presence of a cavity which is an indication for collapse therapy. In rapidly spreading unilateral disease, artificial pneumothorax is urgently needed before cavities have developed. In the subacute adult-type, thin-walled cavities will often heal under rest and simple medical measures but artificial pneumothorax is preferred as more certainly effective and better done early than late. The chronic cavity, with bacillary secretion, is a serious danger and, unless it can be closed by pneumothorax, surgical methods are usually indicated. Apicolysis is the simplest procedure but often disappointing, and total thoracoplasty is often preferable to a partial one. The dry chronic cavity in a patient without toxaemia and few, if any, symptoms is usually best let alone. In cases without symptoms or signs but showing an annular shadow by X-ray, major surgery is quite unjustified. Such shadows often appear and disappear. With full appreciation of the strides made by thoracic surgery in recent years, it should be realized that it is a serious matter to remove a large part of 11 ribs from a patient and such a procedure is not to be lightly recommended.—*Healing of Tuberculous Cavities, L. S. T. Burrell, Br. M. J., July 20, 1935, no. 3889, 102.*—(*A. P.*)

Output of Heart before and after Thoracotomy.—It is generally believed that the subatmospheric pressure in the thorax has an important influence in promoting the circulation. It has been stated that during thoracotomy, intermittent inflation of the lungs is more desirable than continuous inflation. Cardiac output was studied in a series of dogs before, during and after thoracotomy. There was an average decrease of 60.1 per cent in the cardiac output after the thorax was opened. No great difference was noted whether intermittent or continuous inflation of the lungs was used. In no instance was cardiac output restored to the control level after the thorax was closed. The decrease in volume-output of the heart was probably due to the altered pressure relationships which accompanied the thoracotomy. The closed chest is important in maintaining the circulation. It does not appear that the alternate expansion and contraction of the lungs aids in propelling blood through the lungs, but it would seem that the only force of any importance is the systolic contraction of the right ventricle. Two possible reasons why volume-output was not restored after the chest was closed are irreparable damage to the circulation or myocardial damage due to impaired cardiac circulation. Fatalities following thoracic surgery, considered in relation to experimental studies, indicate that the chest cannot be kept wide open for a long time without serious risk of irreparable damage. This risk is chiefly circulatory failure and can be seriously augmented by increasing intrapulmonic pressure at a critical time.—*Studies on the Volume Output of Blood from the Heart in Anesthetized Dogs before Thoracotomy and after Thoracotomy and Intermittent or Continuous Inflation of the Lungs, R. L. Moore, G. H. Humphreys and W. R. Wreggit, J. Thorac. Surg., December, 1935, v, 195.*—(*L. F. B.*)

Air Embolism in Artificial Pneumothorax.—Air embolism occurs about once in every 500 to 1,000 pneumothorax treatments. The type of case in which air embolism is found, when associated with artificial pneumothorax, is practically always one in which the lung appears more or less fibrotic, and the pleura is, and feels, thickened when perforated. In this group is found the case in which pneumothorax was

once given and abandoned, as well as the one in which the lung has been gradually reëxpanding owing to an obliterative pleuritis, in spite of continued pneumothorax treatments. By far the most frequent occurrence is at the induction of the pneumothorax, and especially the 3rd or 4th attempt when there is no established air-space. The symptoms of embolism may manifest themselves before any air is introduced (on which occasions it comes from an alveolus or the pleura) or after a variable amount has been allowed to run in,—anywhere from 10 to 500 cc. As a warning sign the patient may cough up a small amount of blood, or blood may well up through the needle. Often the patient will first complain of local pain, of severe coughing or of feeling "queer." The first sign may be pallor or dizziness, followed by coma and sudden death, a neurological lesion or mental confusion. Objectively, the first sign is often pallor, commonly followed by intense cyanosis. Bradycardia, loss of consciousness, convulsive twitching, cardiac irregularities, apnoea or respiratory difficulty, urinary and faecal incontinence, and vomiting may occur in the severe cases. Focal neurological signs may appear at once or not until the lapse of some minutes. Areas of skin-blanching and marbling as evidence of air embolism are occasionally seen. Air in the retinal arteries may be the explanation for the presence of blindness as one of the symptoms of cerebral air embolism. Air embolism is fatal in percentages varying from 15 to 50. The prognosis of the patient who survives the first ten or fifteen minutes after the accident is good. As to therapy, prophylaxis demands that air should not be given unless the fluctuations are those of intrapleural pressures. A blunt needle is desirable. The readings should be taken every 5 to 10 cc. for the first 50 cc. at least, to preclude the possibility of the needle tip, originally intrapleural, having penetrated the lung. Therapy after cerebral embolism has occurred is symptomatic, and may vary from simple reassurance to epinephrine, caffeine, artificial respiration, and the like, depending on the manifestations in the individual case. In diagnosis the question of pleural shock deserves consideration. Pleural shock is a syndrome caused by irritation or puncture of the pleura, and is characterized by the appearance of a group of symptoms not unlike those of air embolism. It occurs almost only when the pleura is healthy or only slightly diseased. There are authenticated cases of pleural shock in which the syndrome was repeated on each successive puncture of the pleura. In some cases the differentiation is impossible. The indicated therapy is the same in the two cases. If pleural shock is definitely diagnosed and recurs even once, such a patient should not receive further attempts at pneumothorax.—*Air Embolism, C. E. Hamilton and E. Rothstein, J. Am. M. Ass., June 22, 1935, civ, 2226.*—(*G. L. L.*)

Phrenicectomy and Artificial Pneumothorax.—Phrenic exairesis is an important integral part of artificial-pneumothorax therapy in pulmonary tuberculosis. There has been considerable discussion as to whether a paralyzed diaphragm produces its effect by compression, relaxation or immobilization. Each factor is of importance and any relative importance has not been ascertained sufficiently to warrant a definite comparative evaluation. Paralysis of the diaphragm assists in healing because it produces pulmonary compression and relaxation, and gives additional pulmonary rest because of immobilization. In pneumothorax cases more satisfactory results are obtained by phrenic exairesis when there is partial or complete symphysis of the basal visceral pleura and diaphragmatic pleural surfaces. Absence of this factor does not contraindicate phrenicectomy, for favorable results are often obtained when the lung is not adherent to the diaphragm. More conservative indications for phrenic exairesis in conjunction with pneumothorax may be stated; namely, when adhesions cause cavities to remain open; when obliterative pleuritis occurs; during reëxpansion after completion of a successful pneumothorax; in unsatisfactory pneumothorax, due to partial pleural symphysis; to close basal, central or hilar cavities when there are no adhesions apparent. Our cases have been divided according to these indications. In group I, 17 cases, excellent results were obtained in 47.05 per cent, satisfactory results in 35.3 per cent, improved in 5.88 per cent, and unimproved in 11.76 per cent. All cases were classified as far advanced. In group II, 12 far-advanced cases, excellent results were obtained in 3 cases, satisfactory in 4, improved in 2, and unimproved in 3. In group III, 16 cases, satisfactory results were obtained in 15. The unsatisfactory case died of a rapidly progressing lesion in the contralateral lung. In group IV, 7 cases, 4 showed satisfactory results, 2 required thoracoplasty and 1 died of progressive disease. In group V, 8 cases, excellent results were obtained in 5, satisfactory in one, and two died of pulmonary haemorrhage and intestinal perforation, respectively. Diaphragmatic paralysis is of value when factors are present which tend to make pneumothorax therapy unsatisfactory and

when reëxpansion is contemplated after successful pneumothorax therapy. Practically all cases of artificial pneumothorax should be supplemented by diaphragmatic paralysis.—*Phrenic Exeresis in Conjunction with Artificial Pneumothorax Therapy, W. C. Pollock and J. H. Forsee, J. Thorac. Surg., June, 1935, iv, 509.*—(*L. F. B.*)

Thoracoplasty and Artificial Pneumothorax.—Bilateral pulmonary tuberculosis may be treated successfully by performing thoracoplasty in the presence of contralateral artificial pneumothorax. Failure to establish an effective pneumothorax, generally on the more involved side, frequently means that thoracoplasty will be necessary. Pneumothorax should be induced on the better side and conducted as an expansile type of compression for a sufficient period to warrant the application of more radical therapy on the more involved side. During the interval between procedures, hemidiaphragmatic paralysis may be used on the side where thoracoplasty is contemplated. Whether temporary or permanent paralysis is induced should be decided for the cases individually. Since 1931, 12 cases have been treated in this way, without mortality, and are here reported. Four of the cases required a two-stage operation and 8 required only one stage. Pneumothorax therapy in the 12 cases was excellent, and on the thoracoplasty side cavities were closed in ten and greatly reduced in size in two. The surgical collapse should be done cautiously, resecting only as many ribs as can be endured without shock. The contralateral lung is allowed to reëxpand somewhat, only sufficient compression is maintained to prevent pleural symphysis. All patients were given a routine preoperative survey consisting of electrocardiogram, vital capacity, special cardiac-reserve estimation, blood chemistry, blood-typing, blood count and coagulation time. However, there is no test better than the judgment of a good physician in long and close contact with the patient. Patients with a vital capacity of 40 per cent or above should experience little respiratory difficulty during or after operation.—*Thoracoplasty and Contralateral Artificial Pneumothorax, W. C. Pollock, J. Thorac. Surg., June, 1935, iv, 502.*—(*L. F. B.*)

Artificial Pneumothorax under Fluoroscopic Control.—Certain cases receiving pneumothorax become difficult, the reason not always being obvious. Refills were therefore attempted under fluoroscopic control with very satisfactory results. Tracings of the chest are made on a celluloid transparency of the preliminary examination with the patient in the upright and horizontal pneumothorax positions. The difference between the two tracings shows the cause of the trouble. The air is introduced in the usual manner. Sufficient light for the procedure is furnished by a flashlight fitted with a red filter and the operator's hand is protected by a lead shield. The operation is observed and guided under the fluoroscope, changes in the position of thoracic structures being noted. Cases are reported showing the value of the procedure which has been used in 80 patients, 20 of whom received a total of 40 refills. It is indispensable in cases presenting difficulty in giving refills, especially when it seems that such treatment will have to be abandoned. It eliminates guess-work, giving the operator a feeling of confidence and relief. The findings noted with this technic require modification in the present conceptions of "selective collapse."—*The Administration of Artificial Pneumothorax Under Fluoroscopic Guidance, J. Blady and L. Cohen, Radiol., July, 1935, xxv, 1.*—(*G. F. M.*)

Artificial Pneumothorax by Open Operation.—The author describes his experience with 3 cases in which an attempt was made to produce a free pleural space after the usual methods of including artificial pneumothorax had failed because of extensive adhesions. The first case, operated upon in 1914, died after a few weeks of an uncontrollable intestinal tuberculosis. An apparently good collapse of the diseased lung had been obtained. The second case was operated upon in 1934. This patient died about four and one-half months after operation for an acute tuberculous empyema. The pleural fluid had been sterile for about two months, but became infected when the lung was pierced accidently by an aspirating needle. The third case died of pneumonia in the contralateral base. It is recommended that such an operation be shortened by using local anaesthesia as far as possible. Adhesions that are firm should be left until the patient improves.—*Pneumothorax by Open Operation, F. Torek, J. Thorac. Surg., October, 1935, v, 90.*—(*L. F. B.*)

Cerebral Air Embolism with Liebermeister's Syndrome.—Liebermeister has called attention to the presence of sharply defined areas of pallor in the tongue, associated with air emboli, following puncture of the chest for pneumothorax and due to the interruption of arterial flow in the lingual vessels or their branches by air-bubbles. There may be either a small segmentary anaemia on the edge of the tip of the tongue or a total anemia of one half of the tongue.

Liebermeister regards the sign as an early and regular one, almost pathognomonic if present. The case reported was observed by Smith as an onlooker at W. Neumann's clinic at the Wilhelminens Hospital, Vienna. *Case:* A coachman aged 25, had a left upper-lobe cavity with adherent pleura, for which 7 pneumothorax refills were done before treatment was abandoned, all under positive terminal pressures. The first attack, June 26, 1934, was not witnessed by Smith. After a refill of 300 cc. the patient arose complaining of dizziness and weakness of the right leg. Anaemia of the right side of the tongue was noted but the patient recovered in half an hour. The second attack, July 10, 1934, occurred on beginning to dress after a similar refill with pressure of +20 cm. water. The man collapsed, and showed weak and rapid pulse, with facial pallor. There was complete transient right hemiplegia and sharply defined pallor of the right half of the tongue. In twenty minutes this began to disappear and in about a half an hour he could move the right arm and leg slightly. Apathy and pallor persisted for some time. *Discussion:* The transient right hemiparesis of the arm and leg indicates a left cerebral vascular lesion but does not explain the lingual pallor, which should be homolateral. "Pleural eclampsia" is thought excluded by the delayed onset of symptoms. It was conjectured that the high pressure had ruptured an adhesion and exposed a vessel with aspiration of air.—*A Case Exhibiting Liebermeister's Syndrome, Following on Air Filling of the Left Pleural Cavity, A. W. Smith, Tubercle, July, 1935, xvi, 454.*—(*A. P.*)

Reëxpanded Lung.—The duration of collapse and condition of the lung before collapse determine mainly the appearance of the reëxpanded lung. The type of lesion has more influence than the extent. Exudative lesions may heal completely, leaving no scar. Annular shadows, outlining the site of cavities in the process of formation, also vanish from the film. These shadows begin as encircling rows of epithelial cells, giant cells, lymphocytes and fibroblasts. The smallest actual cavities and the small caseous formations often heal by calcification. Large cavities leave scars surrounded by emphysematous-like tissue. The scar appears more or less oblong as a result of pleural traction. However, sometimes a large cavity with fluid-level may leave few or no traces of disease. Three years does not seem too long to keep a collapse instituted for an exudative lesion in a young individual, and six to seven years for an ulcerocaseous process. The pleura seldom comes out of artificial pneumothorax without some complications, the great majority of which are fortunately not severe. After reexpansion of the lung in hydropneumothorax it is difficult to tell whether the homogeneous shadow is due to effusion or thickened pleura. The organized and fibrotic pleura attached to a fibrotic and puckered lung draws over the mediastinum, and prevents the bony thorax from resuming its normal shape. The mediastinal displacement may be in an anterioposterior as well as a lateral direction. However, a reëxpanded lung having previously only an early infiltration will cause no deformity of the bony thorax.—*The Reëxpanded Lung, P. Dufault, Am. J. Roentgenol., June, 1935, xxx, 781.*—(*E. M. J.*)

Intrapleural Fibrin Bodies.—Fibrin bodies were observed in 94 patients receiving artificial pneumothorax. Ninety-one of these cases had a pleural effusion but no fibrin bodies were seen in 74 until after the effusion developed. These bodies usually appeared in the lower portion of the pleural cavity, the majority being attached to the lung, diaphragm, pericardium or chest-wall. A few were freely movable. Single bodies occurred in 90 cases, seven being freely movable and 65 partially movable. Where there were multiple bodies some of them showed partial mobility. The shapes and sizes varied, but most of them had a smooth outline. They cast dense shadows. The irregular bodies are the ones most likely to be missed, especially when attached to the diaphragm, pericardium or lower margin of a partially collapsed lung. Their fate is not known, but some do decrease in size. In 89 of the reported cases the fibrin bodies were still present at the last examination. Five that were seen through the thoracoscope are described as opalescent grayish-white masses varying in size and shape. Microscopically they are composed of a somewhat concentrically arranged dense fibrin network, in whose meshes are blood cells, some of which are still intact. Histiocytes and fibroblasts are present in the periphery of the body. Mention is made of several theories that have been advanced as to their aetiology. The authors think that the fibrin may have come from blood, a pleural effusion, or both. Haemorrhage may be a forerunner in some cases. As the result of local trauma a blood fibrin ball may form in the presence of an effusion to form the nucleus. It is also possible that the nucleus may be fibrin particles separating out from the transudate or from fibrinous deposits present on the pleura in prolonged pneumothoraces.—*Fibrin Bodies in Artifi-*

cial Pneumothorax, H. K. Taylor and I. D. Bobrowitz, Radiol., September, 1935, xxv, 274.—(G. F. M.)

Pneumolysis in Unsatisfactory Artificial Pneumothorax.—Whatever the differences of opinion as to indications for pneumothorax, there can be no disagreement as to its value in suitably chosen cases. The figures on effectiveness of collapse vary, and some authors lead one to assume that a free pleura is exceptional. The main cause of ineffective pneumothorax is too long delay. A case previously treated by rest over a prolonged period usually has adhesions. With the exception of the pleurogenic case, with pleural involvement prior to recognized parenchymal disease, and the smouldering chronic case with extensive involvement, an effective pneumothorax should be possible in the majority if opportunities are not wasted by delay. However, because of the tendency to *laissez faire*, in a considerable proportion collapse is prevented either by direct adhesions over large areas, or by localized bands, which, attached near the site of cavitation, prevent its closure. In such a case, there are two almost certain eventualities, namely, (1) persistently or recurrently positive sputum, and (2) eventual involvement of the other lung. Even though cavities collapse under pressure so that there is no apparent patent space and the sputum remains negative under pneumothorax, two difficulties confront us: (1) before collapse has been kept up long enough for healing to occur, obliterative pleurisy occurs following exudate; and (2) on allowing the lung to reëxpand, the sputum again becomes positive. Also, anything in the nature of a selective collapse is improbable and it is necessary to keep undiseased lung compressed over long periods. *Possible procedures to be considered:* (1) cauterization of adhesions (pneumonolysis); (2) combination of pneumothorax with phrenicectomy; (3) replacement of pneumothorax by major surgical procedures, such as extrapleural plombage, apicolysis, partial or complete thoracoplasty. *Division of adhesions:* In skilled hands, this should upset the patient very little. Its principal risks are (a) infection of the pneumothorax by trauma; (b) rupture of the lung due to tearing at site of adhesions, and (c) haemorrhage from an intercostal vessel, either in the process of attacking the adhesion or from direct damage in introducing the trocar. These risks, which are not formidable, have promoted the vogue, now distinctly less, of phrenic avulsion. *Phrenicectomy:* This does not induce a true collapse and is only occasionally effective in the case of a basal cavity, rarely with an apical one. It is perhaps most useful when there are both apical and basal adhesions which cannot be divided. Its effects in a given case are at best problematical and usually unsatisfactory. In such an event, later procedures may be unfavorably affected by the presence of a paralyzed diaphragm and there is often serious loss of respiratory reserve and infection of the base due to loss of effective cough. *Major surgical measures:* Even with the most perfect thoracoplasty, the resulting collapse is not as good as with a successful pneumothorax and the lung is permanently dysfunctioned. Xalabarder finds, in a review of 3,758 cases, a mortality of 13 per cent, while Behrens gives a mortality of 11.5 per cent in 35 cases of plombage. *Determination of procedure:* It is impossible to ascertain by X-ray alone whether adhesions are suitable for division. If cavities are held out by adhesions, a thoracoscopic examination should first be done, then division of adhesions if possible. Merely to hope for the best often leads to the worst. The remote as well as the immediate prognosis must be considered. *Conclusions:* The fears of internal pneumonolysis are overestimated and, in suitable cases, the risk is greater if let alone. Earlier inducation of pneumothorax should obviate some of these difficulties.—*The Incomplete Pneumothorax: the Case for Internal Pneumolysis, A. J. S. Pinchin and H. V. Morlock, Tubercle, August, 1935, xvi, 481.—(A. P.)*

Open Intrapleural Pneumolysis.—Adhesions which require cutting are those which definitely hold cavities and represent about 5 per cent of the cases in our experience. We are very cautious in opening the pleural cavity in patients with very lax mediastinum. Incision is made in the axillary line, the most frequent approach being through the third interspace. With the aid of the stick light, by transillumination, extent and feasibility of cutting the adhesions can be determined. The bands are easily severed with the electrocautery or endothermic knife. Approximation of the edges of the wound by kangaroo tendon or heavy catgut sutures through or around the adjacent ribs supplemented by a few interrupted sutures in the pleura and intercostal tissue has given the best results in closure. Any effusion present is aspirated and any that appears postoperative is also aspirated followed by warm saline to wash out the pleural cavity. Our 44 cases may be divided into those done before January 1, 1934 and those between January and November 1934. In group I, 10 were technically and clinically successful

with cavities closed and no serious complications; 2 were technically successful but clinically unsuccessful; 8 were technically unsuccessful since adhesions could not be cut; and in 3 there were complications of fistula and empyema and all subsequently died. In group II the figures are respectively; 15, 3, 2, and 1. The latter is progressing favorably. The serious complications develop from inadequate closure. The closed method of intrapleural pneumolysis is satisfactory for the more simple bands but the open method is safer and more efficient where multiple and more complex adhesions are present.—*The Open Intrapleural Pneumolysis Operation, R. Davison and F. I. Fremmel, J. Thoracic Surg., August, 1935, iv, 607.*—(*L. F. B.*)

Oleothorax.—What a few years ago Opengame considered absolute indications for this procedure he now regards in a different light, due to perfection of pneumothorax technique, stricter selection of cases, and the development of thoracic surgery. Oleothorax, however, is still used when we are confronted with the need for more compression; also, as an antiseptic measure in certain pleurisies. *1: Oleothorax for compression:* There are cases in which cavities cannot be collapsed by pneumothorax, despite absence of adhesions. These sometimes have the appearance of being embedded, like cysts, in lung tissue. The volume of oil in the pleura diminished less rapidly than that of gas and often more compression occurs, even without raising the pressure above atmospheric. If positive pressures are used, oil manometers should also be; and care exercised to avoid corticopleural perforations. In cases of obliterating pleuritis following effusion, a better mechanical collapse is maintained by oil, but the process of blocking must be completed in a few days. Even then obliteration may not be prevented, and in such cases thoracoplastic surgery is recommended. *Oleothorax in pleuritis:* Transitory exudates, quickly subsiding, need no such treatment. But when fever and large amounts of fluid persist, oleothorax is indicated. The same considerations hold in purulent pleurisy. However, in severe empyema, there is much need for discretion. When the pleura itself is involved, a pleurotomy with thoracoplasty is better. Cases with huge open cavities and multiple adhesions are dangerous to treat by oleothorax; when only small pockets of oil can be filled it is useless. Briefly, unless an oleothorax is beneficial, it had better be abandoned and some more effective procedure instituted. In acute empyemata with complications, however, it may be of great value and durable results accrue. Empyemata with mixed infection are often treated with gentian-violet but, in its effects on tubercle bacilli, gomenolated oil is superior. Time must not be wasted in these patients and for that reason thoracoplastic surgery is better, as also with perforations of the lung. *Technique of oleothorax:* Vegetable oil is generally preferred to mineral oil, as not producing paraffinomata. It is always better in pleurisy. For purely mechanical compression, pure mineral oil is sufficient. In infected pleurisies, 1 to 10 per cent gomenol or eucalyptol is used. Paraffin oil must be sterilized for half an hour under 10 to 15 lbs. pressure. When cool, gomenol is added as required and the mixture kept at room temperature three weeks. It must be warmed in a double boiler before injection. Even then, it may produce reactions accompanied by chills, fever and vomiting. Sensitiveness is tested by injecting very small amounts, 2 to 5 cc. Not more than 300 cc. should be given at one sitting even in those not sensitive. The ordinary duration of treatment should not exceed three or four months; then gas is insufflated. A preliminary pneumothorax is a prerequisite, except in cases of pleurisy with exudate, when the latter may be replaced directly. Bernou's oil manometer is a very essential adjunct but one may estimate pressure with a simple glass syringe. Needles of 19-gauge are best, but 20- or 21-gauge may be used. A large 100-cc. syringe with petcocks is used, one leading to the oil container. Very hard X-rays are necessary to penetrate the oil film and bring out details in a picture.—*The Limitations of Oleothorax, L. Opengame, Tubercle, American Section, August, 1935, xvi, 508.*—(*A. P.*)

Oleothorax.—There are at present no well-founded reasons for generalizing the practice of oleothorax. It has proved itself inefficacious, both as a substitute for pneumothorax and in the treatment of empyema. On account of the frequent and, at times, serious complications and the inefficacy of the results obtained oleothorax should be used only in exceptional cases.—*Estado Actual del Oleotorax en la Terapeutica de la Tuberculosis, A. Sarno, R. Esteves, A. Artagaveytia and J. Sciutto, Arch. Uruguayos Med., Cir., & Especial., May, 1935, iv, 564.*—(*J. R. P.*)

Intercostal Neurectomy.—Since 1929 when 6 cases of intercostal neurectomy were reported, 16 additional patients have undergone this operation, 14 of whom have been followed for more than one year after

operation. The results of the 20 cases are reported. Intercostal neurectomy does not have a wide field of application. There is a small group of patients without cavitation or with a cavity of less than 3 cm. in diameter, with symptoms of activity, in spite of attempted pneumothorax, prolonged bed-rest, phrenic paralysis, perhaps combined with scaliniectomy, who need further surgical assistance. Only intercostal neurectomy and thoracoplasty are possibly effective for them. The most frequent indication is in those patients whose lesions are so extensive and cavitation so large that thoracoplasty is required but in whom the operation is at the time contraindicated. Postoperative reaction is much milder after intercostal neurectomy except when the pleurae are so thickened that virtually no respiratory movement occurs. The operation is advised against in desperately ill patients. The operation is usually performed in two stages a week or two apart. The posterior 3 or 4 cm. of only the 2nd to 6th intercostal nerves, inclusive, should be resected. The 7th to 9th or 10th nerves should usually be crushed but not resected. In several cases the scalene muscles were resected, in most of them the serratus postecus superior muscle was partially resected, and in all the phrenic nerve was paralyzed. Dramatically quick improvement does not occur, and improvement in the general condition of the patient may not be clearly manifested until 2 to 6 months postoperative. Of the 20 cases at the present time one far-advanced-B and 2 far-advanced-A cases are apparently cured; one moderately-advanced-A patient is arrested; 3 moderately-advanced-A, 2 moderately-advanced-B, 3 far-advanced-A, and 2 far-advanced-B cases are improved; one far-advanced-B patient is unimproved; 3 far-advanced-A, one far-advanced-B, and one far-advanced-C patients are dead. Intercostal neurectomy is indispensable for occasional cases when other procedures have been inadequate and further treatment is necessary, and when, at the time, thoracoplasty may be contraindicated. It should not be used in desperately ill patients nor before bed-rest, phrenic paralysis and pneumothorax have been tried.—*Multiple Intercostal Neurectomy for Pulmonary Tuberculosis, J. W. Strieder and J. Alexander, J. Thorac. Surg., June, 1935, iv, 473.—(J. F. B.)*

Pathology of Thoracoplasty.—The autopsies of 4 cases in which thoracoplasty was performed, from six days to eleven months after the operation, yielded valuable information about the pathological-biological processes which develop following massive collapse of tuberculous pulmonary tissue. There are on the side of the operated lung advanced lesions of the bronchi which present the development of ulcerative lesions of the bronchial walls, of necrosis and atrophy of the bronchial cartilage. Lesions of such a degree have never been seen in patients treated with artificial pneumothorax. In a few cases a total necrosis of the noncartilaginous bronchial walls was present. The bronchi show the picture of endobronchitis, the lumen being filled with detritus; the latter can be transferred to the opposite side as a graft and may give rise to inflammation and to aspiration pneumonia. The mere collapse of a cavity does not represent healing, because in such cases the formation of lacunar pouches around the cavity is observed. This seems to be the rule in cavities which follow reinfection foci in younger adults. All parts of the lungs, chiefly the lower lobes, show lymphatic stasis and partially also venous congestion; in other cases there is development of productive lymphangitis. The healing effect of thoracoplasty in pulmonary tuberculosis results from the formation of fibrous tissue, which diffusely infiltrates the tuberculous lesions. The fibrosis originates from the adventitia of the blood-vessels and from the loose fibrous texture of the interlobar and interlobular septa, which contain most of the network of the pulmonary lymphatics. The pleura shows a well marked reaction following a thoracoplasty presenting fibrous lesions, caseous and pleural thickening. In unfavorable cases with mixed infection, ulceration and sequestration of these foci can be observed. Besides these changes a lipomatosis may develop in the pleural tissue. The opposite lung shows vicarious emphysema and lymph-stasis and apparently also a spread of cellular detritus from the operated side to the bronchi of the healthy lung. Among general pathological changes, lesions of the myocardium of an interstitial inflammatory character without lesion of the muscular tissue are observed.—*Zur pathologischen Anatomie der Thorakoplastik, W. H. Stefko and N. N. Nikitowa, Beitr. Klinik Tuberk., June, 1935, lxxxvi, 327.—(F. G. K.)*

Experimental Total Pneumonectomy.—The most difficult and important problem of lobectomy and pneumonectomy is obtaining a completely air-tight bronchial stump. The inherent difficulties are due to the anatomical structure of the bronchus, with its cartilaginous rings and meagre blood-supply. Healing is brought about by the peribronchial tissue and consequently it is slow. Since the mucous membrane of the

bronchus is frequently contaminated with buccal organisms no sutures should penetrate into the bronchial lumen. Emphasis is placed on preservation of the blood-supply of the peribronchial tissues. Sutures are tied only tight enough to approximate and not strangulate the tissues. The technique described by Willy Meyer, with certain important modifications, was used. This requires the separate treatment of blood-vessels with an atraumatic division of the bronchus followed by closure of the bronchial stump by means of inverting Cushing and mattress sutures. Prior to the use of this technique, 6 pneumonectomies were done, with ligation of the entire hilum. Mortality was 83.4 per cent, and 75 per cent of the animals surviving more than 48 hours developed bronchial fistulae. Using the above technique 30 dogs were operated upon. Because of the high incidence of bronchial fistulae in those in which the bronchus was closed with catgut and almost perfect healing in those in which silk was used for closure, two series were run. The same technique was used, the difference being the type of suture. Of 12 dogs in which 20-day no. 0 chromic catgut was used to close the bronchus, the mortality rate was 75 per cent and bronchial fistulae were 66.6 per cent. Of 18 dogs in which fine and medium silk suture was used, the mortality rate was 16.6 per cent and bronchial fistulae were 5.5 per cent. The low incidence of complications following the use of silk as suture material for closing the main bronchial stump suggests its similar use in human beings.—*Experimental Total Pneumonectomy, J. J. Longacre, J. Thorac. Surg., August, 1935, iv, 587.*—(*L. F. B.*)

Light and X-Ray Therapy of Tuberculosis.—Exact clinical indications for different sources of light have not yet been defined. For extrapulmonary tuberculosis, as that of the skin, bones and joints, intestine, peritoneum and lymph nodes, both the carbon-arc and mercury-arc have shown their value. The beneficial results of such irradiation are due, not only to ultraviolet rays, but also the visible and infrared rays, as well as the conditions of the atmosphere. Uncomplicated exudative pulmonary tuberculosis is a contraindication to light therapy; with proliferative pulmonary tuberculosis, light, if employed at all, should be used cautiously. The indications resemble those of tuberculin therapy. In pulmonary tuberculosis, even when quiescent, harm has been done, especially with too intense and prolonged irradiations. Focal reactions have been shown to occur in the lungs, even when direct sunlight is reflected in overdosage on a tuberculous larynx. The reaction has been likened by some to a tuberculin reaction. In tuberculosis of the urinary bladder, under general irradiations, small nodules have been reported to develop in the bladder, which were considered as focal reactions. The author has seen genitourinary tuberculosis become definitely aggravated because of overexposure. X-ray therapy of pulmonary tuberculosis is effective for the proliferative and fibrous forms when the disease is stationary. The response is slow. Exudative tuberculosis is a contraindication. Overdosage produces damaging focal reactions, often of caseous pneumonia. The best results are had with doses of about three-fourths to four-fifths of an erythema dose. Pleural tuberculosis, dry or serous, is occasionally aided by light therapy. The acute serous form should not be irradiated. Tuberculous empyema does not respond. If sinuses are present, they are rarely helped by light. The indications for the treatment of the larynx depend on the nature of the disease in the lungs. If other local measures do not bring about improvement within a reasonable time, light exposures are indicated. The electrocautery is one of the best methods of treatment in laryngeal tuberculosis. Local light therapy is useful as a postoperative measure in cauterization cases. In lymphatic tuberculosis, irradiation is important. X-rays have not proved of much therapeutic value. General exposures of the body are usually combined with those to the nodes or sinuses. In addition, repeated aspiration, when possible, is made of any fluctuating lymph node. At times incision is necessary. If lymph nodes do not heal with these measures, X-rays are resorted to. Tuberculous lymph nodes regress slowly after X-ray therapy, and, as a rule, only after numerous exposures. If the lymph nodes disappear rapidly after two or three exposures, the tuberculous nature of the disorder is doubtful. The dosage of X-rays should be fractional or suberythemal in amount, administered at monthly intervals for from eight to twelve months. Secondary ulcerative intestinal tuberculosis is the most frequent complication of pulmonary tuberculosis. Artificial light and solar therapy, as well as a rich vitamine diet, should be used in most cases. When results are not obtained by light therapy, roentgen treatment of the intestinal tract should be carefully given. An exposure should be made weekly, with rays generated at a voltage of 135 peak kilovolts and filtered with 4 mm. of aluminum, with the tube at a distance of 35 cm. Light combined with roentgen irradiations often yields results superior to those obtained with

either alone. In peritoneal tuberculosis, ilght therapy should be tried first. The serous exudative type generally responds satisfactorily. The dry proliferative form is more refractory. With X-ray therapy the dosage employed and the technique of irradiation are the same as for intestinal tuberculosis. For unilateral progressive renal tuberculosis or bilateral disease in which one kidney is removed, light therapy is advised as postoperative treatment. It exercises a healing action on the stump of the ureter, which often shows residual ulceration, resulting in a discharging sinus or a persistent cystitis. Light is particularly indicated in renal tuberculosis complicated by genital tuberculosis in which the seminal vesicles and prostate are involved, causing postponement of cystoscopy. It is also indicated, and may help render the disease quiescent in bilateral renal tuberculosis. Circumscribed tuberculous lesions of the urinary bladder may improve under local intravesical light exposures. X-ray therapy has not proved of value in this form of disease except in occasional instances, for the healing of fistulae. In bone-and-joint tuberculosis, heliotherapy is always employed in combination with other orthopaedic measures and rest in the open. Combined conservative treatment includes such measures as immobilization of joints, traction, and the careful use of passive and active motion; use of light, air, tuberculin and diet; judicious application of surgery, and, rarely, roentgen therapy. Surgical fusions are less commonly performed on children under 12 years of age. If performed on adults or children, the disease must first show some evidence of retrogression. In tuberculosis of the skin, lupus vulgaris alone responds specifically to light. Scrofuloderma and erythema induratum may react favorably at times. Lupus erythematosus does not respond, and may be aggravated by light. Ocular tuberculosis and aural tuberculosis respond infrequently to light. Oral tuberculosis is most resistant. Fistulae are often resistant to such treatment. Postoperative sinuses, in contrast, are most responsive. The erythemic reaction is an accurate indicator of skin tolerance. A preliminary exposure to gauge the minimal perceptible erythema will avoid undue burns.—*Light Therapy and Roentgen Therapy in Tuberculosis: Present Evaluation, E. Mayer, J. Am. M. Ass., November 16, 1935, cv, 1599.*—(*G. L. L.*)

Ultraviolet Radiation in Tuberculosis.—A study was undertaken to determine the value of sunlight and artificial radiation in the treatment of pulmonary tuberculosis. It was felt that this treatment should not be limited in its usefulness only to relatively inactive cases, but that, if it were of benefit at all in the treatment of pulmonary tuberculosis, it should show some definite results in three months' treatment in active cases. The series consisted of 30 cases of active pulmonary tuberculosis, with 60 controls, and 30 post-thoracoplasty cases, with 81 controls. The comparative study of results as compared with the end-results in control cases led to the conclusion that ultraviolet radiation of the described intensity in doses sufficient to produce a mild erythema and subsequent pigmentation produced no beneficial effects in cases of active pulmonary tuberculosis or in cases following thoracoplasty. Near a large city such as Chicago, the changing atmospheric conditions introduce obstacles that make the selection of the dosage factors impossible in heliotherapy. The generally listed dangers following ultraviolet irradiation in cases of pulmonary tuberculosis have been exaggerated, provided the dosage of ultraviolet radiation is carefully regulated. Careful, repeated studies of the blood in this series revealed that the irradiation had no particular or uniform effect on the red-cell count, the white-cell picture, or the haemoglobin value.—*The Treatment of Pulmonary Tuberculosis by Ultraviolet Radiation, J. S. Coulter and H. A. Carter, J. Am. M. Ass., July 20, 1935, cv, 171.*—(*G. L. L.*)

Chrysiasis Following Use of Gold Salts.—This condition, a special form of skin discoloration, is not uncommon, but sometimes overlooked because of its delayed appearance, often a year or more after cessation of treatment, and not readily recognized except in its more severe forms unless one is on the lookout for it. Four cases are here reported following the sanocrysin treatment of tuberculosis. Except in the most marked, the discoloration was not unsightly, and even gave an appearance of "delicacy" quite attractive to those not averse to artificial complexions, especially in its effect on the eyelids. All four patients had what might be termed "fine" soft skins. Chrysiasis appears to be a photographic effect, fluctuating according to the degree of exposure to light and associated with deposition of gold in the deeper layers of the skin, demonstrable microscopically and by incineration methods.—*A Note on the Occurrence of Chrysiasis Following Treatment by Gold Salts, W. C. Fowler, Tubercle, September, 1935, xvi, 539.*—(*A. P.*)

Pulmonary Secondary to Upper-Respiratory-Tract Disease.—Nasal obstruc-

tion, pharyngitis, mastoiditis, infected tonsils, as well as sinusitis, may cause frequent colds, persistent cough, some expectoration, malaise, malnutrition, anorexia, fatigue, and definite roentgenological pulmonary changes which persist for years after the patient is clinically well. These pulmonary changes consist of a definite uniform increase in width of the markings, causing them to cast a more dense shadow. Lymph-node enlargement usually plays only a small part in the exaggerated hilum shadow. The lines of the bronchovascular tree do not, as a rule, touch the periphery of the lung and, except in the most severe cases, there is no parenchymal involvement. The latter seems to be due to an encroachment of interstitial fibrosis upon the lobules and is best seen between the primary lower lobe bronchi and the mediastinum. The persistence of the roentgenological findings seem to signify that changes are due to perivascular, peribronchial or interstitial fibrosis, or any combination of these three. The apparent loss of elasticity of the air-bearing tissue, the diminished diaphragmatic excursion, the decreased pulmonary capacity, and the tendency of the neglected cases to develop bronchiectasis and bronchiectatic abscesses, certainly speak against the possibility of the reaction being of a transitory nature such as passive congestion.—*Pulmonary Changes Associated with Upper Respiratory Tract Abnormalities and Diseases, T. G. Clement, Am. J. Roentgenol., September, 1935, xxxiv, 364.*—(*E. M. J.*)

Localized Pleural Effusion.—Cases of localized pleural effusion in heart failure, previously reported by Steele, Stewart and Kiser, are briefly described. All of these cases had a localized interlobar effusion accompanying cardiac decompensation, the fluid disappearing with improvement in the cardiac symptoms. Autopsy findings in such cases show a generalized adhesive pleuritis obliterating all of the pleural cavity, except for a few small spaces which are lined by apparently normal pleura and filled with a fluid which is a transudate. No inflammatory or infectious processes have been found that are severe enough to explain the pleurisy. The latter is probably the result of chronic heart failure. The symptoms are not characteristic but are those of congestive heart failure. Physical examination may not reveal the localized effusion. Certain characteristics of the condition help to differentiate it from an empyema or a metastatic nodule. In all cases reported it has been present on the right side, the fluid disappears with improvement but may recur in subsequent attacks. X-ray shows the effusion to be sharply localized, the heart is generally enlarged, and the chest may show signs of congestion, fibrosis, and generalized thickening of the pleura. Shiflett reports two new cases.—*Localized Pleural Effusion Accompanying Congestive Heart Failure, E. L. Shiflett, Radiol., October, 1935, xxv, 429.*—(*G. F. M.*)

Air Bubble in Pocketed Hydropneumothorax.—This pocket is likely to be in the posterior and lateral portions of the pleural space due to the supine position of the patient while reëxpansion of the lung is taking place. With the patient in the erect position, the air-bubble is overlapped by normal lung leaving only a horizontal line of fluid. Roentgen-ray examination of the patient while lying on the unaffected side with a sand-bag under the hips will unveil the air bubble. The nonhorizontal fluid line, sometimes seen when the patient is in the erect position, is often due to masses of fibrin.—*The Weiled Air Bubble in Hydropneumothorax, E. Korol and H. A. Scott, Am. J. Roentgenol., June, 1935, xxx, 777.*—(*E. M. J.*)

Congenital Cysts of Lung.—A four-months-old colored boy with normal postnatal history was admitted with a history of onset of coryza and cough two weeks previously, high fever and rapid grunting respirations for the last week. On admission, clinical, physical and roentgenological findings warranted a diagnosis of left upper lobar pneumonia and otitis media. When signs of consolidation in the right upper lobe appeared several days later it was considered migratory pneumonia. The child had been in the hospital nine weeks when he died after two weeks of the second attack of fever, weakness, cyanosis and dyspnoea. Between the two attacks he gained weight and became less anaemic. The pulmonary findings did not clear, and tuberculous infection and lung abscess were considered. However, the tuberculin reaction was persistently negative. Roentgenograms of the chest showed a progressive increase in number and size of what appeared to be pulmonary cavities. Necropsy revealed multiple cysts in both upper lobes and between the right upper and middle lobes, and the left upper and extra middle lobe. The largest cyst measured 4.5 by 4.5 by 4 cm. Some of the cysts contained pus, and bronchopneumonic and atelectatic areas were found. In several of the cavities direct communication with a bronchus could be demonstrated, while in others the communication must have been by means of a very narrow channel allowing the access but not the egress of air. The cysts in this case are

considered to be of congenital origin because of their smooth-lining wall, and the flattened atypical lining epithelium; the presence of an anomalous left lobe; and certain acinous-like formations seen in one of the sections. The gradual inflation of the cysts has most likely been operative since respirations began.—*Congenital Cysts of the Lung, J. P. Scott and A. D. Waltz, Am. J. M. Sc., June, 1935, clxxxix, 788.*—(*E. M. J.*)

Bronchiectasis.—One hundred cases have been collected and analyzed, the diagnosis having been proved by lipiodol injection or postmortem. A high percentage of cases of childhood nontuberculous lung infection occur between the ages of 2 and 5 years. Sixty-four per cent of all cases occur before the age of 20 and between 40 and 50, the disease being uncommon between 20 and 40, and rare after 60. Males show a slightly higher incidence than females. No case showed a purely apical distribution. There were 8 acute cases in the series. Thirty-five patients showed clubbing of the fingers; in two of these the toes were also clubbed. Five of the 8 acute cases showed clubbing. The average duration of the disease with clubbing, under treatment, was 9.4 years for adults and 8.3 years for children. That of chronic cases coming under treatment was 6 years for adults and 4 years for children; and, of the disease of those who died, it was 14 years for adults and 9.2 years for children. Twenty-four per cent of the cases had frank haemoptysis, and 38 per cent had blood in the sputum at some time. Sixty-eight per cent of the cases started their disease with cough, 5 per cent with cough and sputum, 4 per cent without cough, and the remainder had cough at recurring periods. Offensiveness of the sputum does not appear to depend upon the length of the disease. Nine cases showed definite loss of weight; all were adults. Of possible complications, paranasal sinusitis occurred in 4 cases, all adults, and arthritis in three, all children. Most of the cases showed a mixed type of infection, with pneumococci predominating in 15, *M. catarrhalis* in 11, and Pfeiffer's bacillus in 17. Twenty per cent of the cases showed a collapse of a lobe. Thirty-five children, out of 48, began their illness with cough or cough and sputum. Of these, 25 had suffered an attack of measles or whooping-cough or both. In a second group the disease was preceded by attacks which were generally called acute bronchitis and bronchopneumonia. In 4 cases the disease started with fever, 6 with haemoptysis, and in the rest of the 48 children it began in various ways. The early symptomatology of bronchiectasis in children is that of its precursors. Of the 52 adult cases, 18 developed their disease after one attack of an acute lung infection, 10 after winter cough, 5 after measles, and 7 after epidemic influenza. No case of chronic lung infection has been seen following pneumococcal lobar pneumonia. Three of the 5 measles cases were observed. They simulated measles, except that the rash resembled a true urticaria more than a measles rash. Pyrexial attacks in the course of the disease are of two types. In the first there is catarrhal reaction in the smaller bronchioles, pleural involvement, and, in general, temporary extension of the disease. The second type is a true bronchopneumonia with further extension of the disease.—*Bronchiectasis, E. Fletcher, J. Thorac. Surg., June, 1935, iv, 460.*—(*L. F. B.*)

Congenital Bronchiectasis.—Few cases of congenital bronchiectasis have been reported since Laennec called attention to the condition, although some recent writers believe that in children bronchiectasis is congenital in origin. There is no doubt that it usually occurs as the result of chronic cough and that pertussis and bronchopneumonia so affect the bronchial walls and their elastic tissue as to produce dilatation but there is always the possibility that these affections may disclose or aggravate a congenital lesion. A case is reported which was diagnosed as pulmonary tuberculosis and hospitalized for this condition. This nine-year-old child had never been very strong and had always had a nonproductive cough. There was no history of a tuberculous contact. Eight Mantoux tests were normal. Some greenish mucopurulent material was obtained by postural drainage, but examinations of sputum and stomach washings were negative for tubercle bacilli. X-ray, after the instillation of lipiodol, was very suggestive of a bronchiectasis secondary to tuberculosis of the tracheobronchial lymph nodes. In the absence of definite clinical evidence of tuberculosis or a history of any of the acute infections generally believed to cause bronchiectasis, a diagnosis of congenital bronchiectasis was made.—*Congenital Bronchiectasis in Children, G. S. Reitter, Radiol., October, 1935, 495.*—(*G. F. M.*)

Aetiology of Bronchiectasis.—The author has studied 110 cases of bronchiectasis from the standpoint of previous morbid history, and comes to the conclusion that no specific organism produces the infection which causes damage to the bronchial wall. It is his opinion that the initial fault in bonchiectasis is damage and subsequent

weakening of the bronchial wall, probably caused by a nonspecific infection. The forces causing physiological dilatation, if applied to a weakened bronchus, as found in bronchiectasis, will cause permanent or pathological dilatation. Certain added factors such as atelectasis of the parenchyma, fibrosis of the parenchyma, and central bronchial obstruction, increase this physiological dilating force and tend to augment permanent or pathological dilatation. Congenital bronchiectasis should be diagnosed, either pathologically or clinically, with much hesitation. Many of the cases diagnosed clinically as congenital are probably acquired. The known aetiological factors causing acquired bronchiectasis may explain the origin of practically all cases of bronchiectasis. The conception of bronchiectasis as a primary disease of the bronchus secondarily affecting the parenchyma alters the interpretation of signs and symptoms and the application of therapy. The general or systemic symptoms are dependent chiefly on the condition of the parenchyma of the lung. Acute pneumonia occurs frequently in the bronchiectatic lung: 52 per cent of the author's cases presented at least one attack and 27 per cent more than one attack. It is obvious that the prognosis depends on the extension of the infection into the parenchyma of the lung or to other parts of the bronchial tree. Twenty-three per cent of the author's patients are dead after having the disease for an average of nine years. When bronchiectasis has become established, with secondary changes in the parenchyma, medical treatment consists of draining the dilated bronchi. When permanent or pathological dilatation has taken place, surgical removal of the diseased lung is the only method of cure.—*Factors Causing Bronchiectasis: Their Clinical Application to Diagnosis and Treatment, W. P. Warner, J. Am. M. Ass., November 23, 1935, cv, 1666.*—(*G. L. L.*)

Surgical Treatment of Bronchiectasis.—This condition is of surgical interest (1) when incipient, and (2) when well established. *Treatment or prevention in "predilatation stage":* In this stage anything which diminished the expansile forces, the outward pull on the weakened bronchi (for instance, in delayed resolution or post-bronchopneumonic complications) will tend to check the progress of bronchial dilatation, whether due to contracting fibrous tissue or normal negative intrapleural tension. *1: Phrenic-nerve operations:* Hedblom obtained durable symptomatic cures with phrenic avulsion, proved by negative bronchograms with lipiodol. Alexander used temporary paralysis, induced by crushing the phrenic in a number of children and adolescents suffering from suppurative pneumonitis prior to development of abscess or chronic bronchiectasis, with gratifying results. *2: Artificial pneumothorax:* In suppurating conditions this involves undue risks of empyema and for that reason other collapse methods are preferred. When the disease process is further developed phrenicectomy is of less value, although Edwards and Thomas mention its curative effects in early bronchiectasis with lower lobe abscess. *Well-marked or advanced stage:* Here there are three possible methods: *1*: drainage, including (a) postural, (b) bronchoscopic, and (c) external. These procedures are not here discussed in detail. Postural drainage means something more than hanging the patient's head over the edge of the bed five minutes twice daily. It is of value chiefly preoperatively and postoperatively. Bronchoscopic drainage is a more formidable procedure. It is accomplished not by actual penetration of the smaller bronchi by the bronchoscope, which is mechanically impossible (a 7-mm. bronchoscope will not go into a 2-mm. bronchus) but by the combination of suction and the "tussive squeeze" (Jackson). This can be visibly demonstrated after cautery pneumonectomy. In estimating the value of bronchoscopic drainage the patient should first be asked to empty his chest as much as possible by his favorite method of drainage and then the additional pus aspirated through the bronchoscope measured. The effects are of course temporary only and patients vary in their response and reaction. Weekly intervals are good as a general rule, the duration of treatment depending on the patient. Bronchoscopic lavage is not recommended. Bryce has had two deaths from bronchopneumonia due to it and Ballon has reported several cases of nonfatal bronchopneumonia resulting from it. Gomenol injections are of doubtful value and often irritating. Bronchscopy should also be employed in nearly every case for diagnostic purposes. It will demonstrate foreign bodies, localize sources of pus, and disclose tumors, most often malignant. External methods of drainage are contraindicated. *2: Ablation of the diseased area:* Thoracic surgeons are becoming more and more convinced that this is the only really effective treatment. There are two methods (1) cautery pneumonectomy, introduced by Graham, and (2) lobectomy, either by Alexander's technique or that of Brunn and Shenstone. The chief drawback is its limited application, restricted to unilobar cases, which Bryce finds consist of not over 10 per cent of all he

sees. Alexander uses a two-stage method, the first stage consisting only of measures to induce adhesions, while, after the second the wound is left open after four or five days and the lobe sloughs away in ten to twenty days, the resulting fistula is closed by a plastic operation if it fails to heal. The second method, of Brunn and Shenstone, is gaining adherents and displacing the first. Only one stage is required, the pedicle is controlled by tourniquets and divided, and the raw stump oversewn, closing blood-vessels and burying bronchial cut-ends. The chest is closed but drainage provided for. Lilienthal of New York, who was one of the first to attempt this, by slightly different methods, had a mortality of 64 per cent, but recently Edwards and Thomas report a mortality of 14 per cent in 57 cases done at Brompton Hospital, London. Nissen in Sauerbruch's clinic had only 4 deaths out of 38 lobectomies,—about an 11 per cent mortality. Bryce obtained 4 recoveries out of 5 lobectomies at Manchester, England, employing the Brunn-Shenstone method in all the successful ones. It is certain that the day of helpless inactivity is past, and that more than a few suffering from this distressing and unpleasant condition can be restored to health, self-respect and usefulness.—*Surgical Treatment of Bronchiectasis, A. G. Bryce, Brit. M. J., February 23, 1935, no. 3868, 350.*—(*A. P.*)

Bronchiolectatic Emphysema of Adults.—This condition is more properly termed polycystic disease of the lung with bronchial communication. The causative factors are the same as in bronchiectatic disease and the two conditions are always present in the same chest. If the pre-terminal bronchioles are occluded during prenatal growth the end-buds and terminal bronchioles remain as closed cysts to form the cystic lung of a closed-cyst type. By the continued thoracic suction on inspiration, expiratory push, cough with its markedly elevated expiratory push, infection, and parenchymal fibrosis, the infantile bronchi pass from dry bronchiectasis into bronchiectatic disease by the time adult life is reached. Both bullae and bronchi are now chronically infected; their walls alternate between granulation and epithelization; interstitial tissue and adjacent alveoli are being slowly incorporated into a chronic inflammatory process with fibrosis and atelectasis ensuing. Middle age, if attained, finds these individuals in a deplorable condition. General failure, which necessarily must develop, comes from physiopathological changes and not from broncho-pulmonary infection alone, because chronic infection has caused them to tolerate new virulent organisms well. The originally normal respiratory alveoli have become emphysematous so that air-hunger is present; chronic nephritis, myocarditis, emaciation and debility complete the picture of general physical disintegration. The two cases presented were patients almost 40 years of age who had had a dry cough since childhood with susceptibility to attacks of fever and productive cough. Recent symptoms were severe, as were productive cough, dyspnoea, weakness, fatigue, anorexia and pain. Both improved on postural drainage and bed-rest. One patient received lipiodol instillations also.—*Bronchiolectatic Emphysema of Adults, H. H. Cherry, Am. J. Roentgenol., June, 1935, xxx, 774.*—(*E. M. J.*)

Putrid Abscess of Lung.—Pulmonary abscess following dental operations is generally pictured as a sequel to aspiration of a tooth following extraction. The 12 cases reported indicated that lung abscess occurs not infrequently after dental operations when there is no evidence of deglutition aspiration of a tooth. The two routes of infection are the transmission of embolic material by the blood-stream and by direct aspiration. The latter, and usual, mechanism is the aspiration of particulate infected material during operation or in states of unconsciousness however induced. Aspiration is most likely to occur with loss of the pharyngeal reflexes. The first clinical manifestations of pulmonary abscess are often noted within a few days following operation and continue in a fairly orderly sequence. They are a definite period of incubation when there are no obvious symptoms; initial symptoms of feverishness, chilliness or actual chill; usually followed by pain in the chest; circumscribed tenderness to pressure associated with the pain; unproductive cough, having perhaps a foul odor, usually begins after the onset of pain; expectoration of foul pus begins suddenly on the tenth to twelfth day. An accurate chronological record cannot always be obtained and clinical manifestations may be atypical. While there is no set maximum interval before onset of symptoms, it is fair to assume that the two-week interval represents the usual limits. Local anaesthesia was employed in 8 of the 12 cases, nitrous oxide in 3, and no anaesthesia in one. There is a suggestive relationship between aspiration and the dulling of reflexes in the posterior part of the mouth. The most obvious preventive measure is a meticulous toilet of the mouth before operation. All patients should be seen 3 weeks after opera-

tion to check the interval history with reference to symptoms of pulmonary abscess. The 12 cases presented are from 70 consecutive and unselected cases of pulmonary abscess, and suggest strongly causes traceable to dental operations.—*Putrid Abscess of the Lung following Dental Operations, L. Stern, J. Thorac. Surg., August, 1935, iv, 547.*—(*L. F. B.*)

Putrid Abscess of Lung.—In many instances a careful case-history is the most important factor in clarifying the diagnosis. The disease is produced by aspiration of certain anaerobic microörganisms that cause gangrenous infection. The original seat of the organisms is almost always the mouth and pharynx, especially the teeth, gums and tonsils. The loss or blunting of the normal pharyngeal reflexes, from any cause, is often the cause of aspiration. The mass of infected material, usually small, is arrested in a terminal bronchus or bronchiole. The first stage is a primary tissue gangrene with surrounding intense suppurative pneumonitis, affecting the entire parenchyma of the involved area. A line of demarcation quickly forms. The contents of the cavity thus formed consist of sloughing lung tissue and pus having an extremely foul, pungent odor. One or more bronchi become eroded providing natural drainage. Occasionally the entire putrid slough separates with spontaneous cure but usually bronchial drainage is inadequate. The lesion becomes subacute and may remain more or less quiescent for weeks or months with occasional peripheral flareups. It may spread by direct extension or spill-over may occur into normal bronchi. Ultimately a multilocular abscess or multiple contiguous abscesses are produced, with inflamed and fibrotic surrounding parenchyma, and bronchi are dilated. This, the chronic phase, is reached usually in 3 or 4 months. Early pleural reaction, with formation of firm fibrous adhesions, is a constant finding. Early symptoms are mild and begin within a week after infection. They begin as dry irritating cough, chilliness, slight fever, followed by stabbing pain in the chest. Fever is irregular and attended by sweats. Before the end of the second week foul breath and sputum and often blood appear. In the early stage, physical signs are meagre and X-ray examination suggests a patch of pneumonic infiltration. With the appearance of more and fouler sputum symptoms abate. At this point about 23 per cent of cases are spontaneously cured. There may be a remission of a few days or weeks with relapse exhibiting the same symptoms as at onset. In untreated chronic cases duration of life is less than 3 years. Symptomatology may be atypical, especially in children. Foul odor is the characteristic stigma of putrid lung abscess, and is always present at some time. Continued absence suggests rupture of the abscess into the pleural space. In nearly one-third of the cases chest pain preceded other symptoms. Bleeding is a regular symptom and is far more frequent than in tuberculosis. Leucocytosis varies with the activity of the disease; over 25,000 suggests complications. Clubbing of fingers and toes appears early. Complete disappearance is seen following cure of an acute abscess. Persistence of clubbing indicates a persistent undrained focus. Physical signs are surprisingly few, and X-ray is the most important aid in studying each case. No case may be called cured until all symptoms and X-ray findings have disappeared. Pleural complications may be an acute haemorrhagic pleurisy which quickly becomes purulent, a putrid pyopneumothorax or chronic putrid pyopneumothorax with pleuropulmonobronchial fistula. It is incorrect to speak of postpneumonic or metapneumonic lung abscess; such cases are to be regarded as primary lung abscess with hyperacute onset.—*The Symptomatology of Putrid Abscess of the Lung, A. S. W. Touroff and S. E. Moolten, J. Thorac. Surg., August, 1935, v, 558.*—(*L. F. B.*)

Subphrenic Abscess.—This is one of the serious complications of abdominal disease, the close proximity of the liver and pleural cavity adding to the hazards. Pressure changes and movements incidental to respiration influence the progress and course of an infectious process here, while technical problems of establishing and maintaining drainage are increased. The condition is not commonly met with, but its possible existence and seriousness should be considered. The mortality in untreated cases approximates 100 per cent; in treated cases the mortality varies with the promptness of recognition and adequacy of surgical management. Its clinical symptoms and signs were described by Barlow in England, in 1845 and by von Leyden of Germany a little later. Ochsner and Graves made a very complete review of the literature, with a total of 3322 reported cases, and added 50 of their own. Von Volkman, in 1879, performed the first operation and Trendelenburg introduced the transpleural approach. Ochsner has pointed out the advantages of a retroperitoneal approach with a one stage operation. *Aetiology and pathogenesis:* Infection in the right lower quadrant of the abdomen spreads upward and travels lateral to the caecum and ascending colon. A

pelvic infection may follow the same course or ascend up the left vertebral gutter. Infections originating in the gall-bladder, pylorus or duodenum spread usually to the right subhepatic area, and then either over or under the liver. Those in the perinephric area spread by direct extension to the corresponding posterior superior space. Infection from gastric lesions usually spreads to the left. But right-sided location of subphrenic abscess occurs in over 90 per cent of cases. Continuation into the chest may occur. Overholt and others have found that negative intraperitoneal pressures prevail during quiet respiration and that this negative pressure is increased during inspiration. Thus, infectious material is actually sucked up to that part of the peritoneal cavity. Opposed to this action is the force of gravity with the patient upright or sitting. *Diagnosis:* The possibility of subphrenic abscess is to be thought of whenever the general evidences of sepsis disturb the postoperative course of an abdominal case. Wound infection, pulmonary complications, pyelitis, and peritonitis must also be considered. Suggestive symptoms of subphrenic abscess are (1) upper abdominal discomfort or pain; (2) difficult breathing; (3) pain referred to chest, shoulder or neck; (4) hiccough. Suggestive local signs, if present, are (1) respiratory limitation; (2) localized oedema or tenderness, especially on heavy percussion; (3) downward displacement of the liver; (4) palpable mass below costal arch; (5) chest findings such as (a) limitation and elevation of diaphragm, (b) decreased or absent breath-sounds in the lower chest, and (c) signs of fluid above the diaphragm; (6) X-ray findings such as (a) elevated and fixed diaphragm, (b) haziness of the lower lung field, and (d) contralateral heart displacement; and (7) aspiration of pus or diagnostic puncture. *Differential diagnosis:* Conditions to be distinguished include (1) generalized or localized peritonitis, which may be very confusing but clinical and abdominal signs should differentiate; (2) liver abscess, the clinical course of which is more severe, the lung reaction less marked and jaundice often present; (3) perinephritic abscess, with less diaphragmatic change and less pleural reaction; (4) encysted thoracic empyema, the history and clinical course of which differ and aspiration with injection of air and X-ray examination will distinguish this condition; and (5) *postoperative* lower-lobe or massive collapse, in which the heart displacement is homolateral, and a high diaphragm with some clouding is normal after abdominal operations within 10 days. *Treatment:* Incision and drainage are the cardinal principles, and as soon as possible after the diagnosis is established. The two-stage transpleural operation is most used, resecting segments of the 8th and 9th ribs in the midaxillary line under local anaesthesia. The corresponding intercostal vessels and nerves are also resected, and the parietal pleura anchored to the diaphragm with interrupted sutures. At the second stage, twenty-four to forty-eight hours later, the adherent pleura and diaphragm are opened with the cautery, the abscess explored and trabeculations broken down and drains inserted. In some cases, the abscess can be safely approached by incision below the costophrenic sinus and a single-stage operation be done. Ochsner excises a portion of the 12th rib and goes in posteriorly. After removal of the drains, gentle suction irrigation is established. *Summary and results at Lahey Clinic:* In over fourteen years there have been 25 proved cases. The value of X-ray diagnosis is emphasized. Elevation of the diaphragm and haziness of the lung field were quite constant. A diagnostic tap was positive in 14 of 21 cases. Pleural effusion is a frequent and often early associated finding. Eight patients died, 7 of the primary condition, as established by necropsy. Earlier exploration might have prevented some of these.—*Subphrenic Abscess, R. H. Overholt and J. C. Donchess, New England J. M., August 15, 1935, ccxiii, 294.*—(*A. P.*)

Pneumonoconiosis in South Wales Colliery Surface Workers.—The examination covered 30 youths and men never at any time employed underground. Their ages varied from 21 to 68 years, and their periods of employment in the colliery from four to forty-five years. Most of them suffered from respiratory catarrh during the winter months, and those in the later stages from marked dyspnoea on exertion, with very little chest expansion. *X-ray findings:* These were divided into the usual three stages, which did not correspond either to age periods or length of time at the work. The first stage showed slightly exaggerated hilum shadows, with a fine lacework on the right, and the diaphragmatic cupola irregular on both sides. A little later a similar network was noted in the left lung field and both fields showed a "ground-glass" appearance. Ten of the group were in this stage, their ages ranging from 23 to 58, and their duration of work from nine to thirty-two years. The second stage may be subdivided into early, medium, and late. The apices were grayish, but cleared after cough. The costodiaphragmatic angles were obtuse and the diaphragm markedly flattened. In the lacework, on the middle half of the right

lung, were irregular granular opacities. There were 16 men in this group, their ages from 21 to 72 years, and their duration of work four to forty-four years. The third stage showed woolly masses with intersecting lines and irregular densities. Fluoroscopically, the diaphragm showed limited movement and wave-like undulations. The sputa were all negative for tubercle bacilli. There were four men in this stage, their ages 50 to 66 years, duration of work, thirty to forty-one years. *Discussion:* There is no detectable difference in X-ray appearance between these men, and those working in hard headings with drilling machines, except that the surface workers suffer earlier from emphysema. These findings show that our present knowledge of silicosis is limited, and that combined data from the investigations of mining engineers, mineralogists, roentgenologists, and pathologists, are badly needed. At present, the extent of silicosis, in the steam- and soft-coal areas, is absolutely unknown, since they have not been subject to systematic investigation.—*Pneumoconiosis in South Wales Colliery Surface Workers, A. Harper, British M. J., June 22, 1935, no. 3885, 1264.*—(*A. P.*)

Pneumonoconiosis and Silico-Anthracosis.—At the *International Congress on Silicosis*, Johannesburg, South Africa, 1930, the following definition of silicosis was finally accepted: "A pathological condition of the lungs due to the inhalation of silicon dioxide." Recently, this has been challenged, especially by W. R. Jones of the Royal School of Mines, London, who associates silicosis with sericite (1933), and certain pathological effects may follow the inhalation of mineral particles, for instance, asbestos combined as silicates. Therefore, the following less stringent definition is suggested: "a pathological condition of the lungs due to the inhalation of silica, whether free or combined, in such a state as to be capable of setting up its characteristic pathogenic effects." It should be realized that the dust inhaled by the industrial worker is practically never pure but always mixed. *Types of dusts: 1: Chemically active dusts* must necessarily be soluble, more or less in the body fluids, their activity depending on such solubility. This activity causes lesions of two types, "toxic" and "sclerotic," reproduced experimentally in Great Britain by Gye, Purdy and Kettle, and in America by Gardner. The toxic lesions depend on local necrosis and cell-death, and appear to favor pullulation of tubercle bacilli. The sclerotic lesions take the form of nodular and diffuse fibrosis characteristic of silicosis. *2: Inert dusts* are insoluble in body fluids, and can therefore exert no chemical action in the lung tissues. They may exert the mechanical action characteristic of foreign bodies, leading to a certain amount of diffuse fibrosis. Certain chemically inert dusts, such as carbon, may absorb toxic substances. The lung tissue after death presents to the investigator a record of the mineral particles breathed in during life,—a kind of palimpsest of the individual's industrial history. The persistence of a given substance in the lung tissue and its preponderance in lung residues do not themselves constitute proof of its aetiological importance. *Classification of the pneumonoconioses: 1:* Those due to inhalation of a chemically active dust resulting in nodular fibrosis. On X-ray films, there will be shown bilateral symmetrical mottling. *Examples:* Silicosis, asbestosis. *2:* Those due to retention and accumulation of an inert dust, with lymphatic obstruction, resulting in nodular and diffuse fibrosis and dust accumulation. X-ray films also show bilateral symmetrical mottling and irregular diffuse shadows. *Examples:* Silicoanthracosis, silicosiderosis. *3: Accumulation of inert dust* with *insufficient elimination*, resulting in black anthracotic but usually well aerated lungs with little fibrosis. X-ray films are either negative, or show partial slight mottling. *Examples:* Anthracosis of coal-trimmers and screeners. *4: Localized dust retention in areas of obstructed lymph flow* due to old tuberculosis or other lesions, resulting in fibrotic "india-rubber like" areas of asymmetrical distribution. X-ray films show "cricket-ball" or pseudoneoplastic shadows. *Examples:* Silicoanthracosis in coal-trimmers and screeners. *Silicosis* and *miners' phthisis:* Until recently the occurrence of any form of silicosis in the coal-mining industry was either denied or ignored, silicosis being mentally associated with "miners' phthisis," a tuberculous wasting disease supervening as a last phase in the silicotic gold-miner or other worker in quartz or quartzite. Coal-miners, however, do actually exhibit a great deal of what Cummins terms "miners' dyspnoea," with extreme sclerotic and mechanical manifestations, but not often passing on into "miners' phthisis." *Silicoanthracosis:* Here, there is, in addition to siliceous dust in and around tuberculous foci, a large quantity of finely divided coal-dust. In such tasks as "sinking," "boring" and work with compressed-air drills in "hard headings," the worst cases of such nature arise. *Effects of different dusts and processes:* Most underground workers in coal-fields normally encounter coal-dust in the processes of ripping roof or repairing, and many take a turn at work in

"hard headings" from time to time. There is also the stone-dust used for "dusting" as a precaution against explosions, usually an inert shale but not always. Silico-anthracosis, in fact, may occur in all types of colliers exposed to both stone- and coal-dust, but especially in those working with mechanical drills in hard stone. The "sinkers," "borers" and "hard heading" workers are liable to exhibit advanced silicosis after a relatively short period of work, with a marked tendency to phthisis. At the other extreme are the coal-trimmers. The effect of silicosis *per se* is to produce "miners' dyspnoea," and not "miners' phthisis," although it creates a special liability to the latter. The incidence of this "miners' dyspnoea" is marked, producing a high bronchitis (and bronchopneumonia) mortality, the terminal effect of a high tuberculosis mortality being diminished probably through the absorbent effects of coal-dust. However, Enid Williams has shown that a benign type of tuberculosis is common among these dyspnoeic subjects, especially old miners. The increasing use of compressed-air drills has offset the great improvement in ventilation and general hygiene of coal-mines in the last fifty years. The Registrar-General's *Decennial Supplement* for England and Wales, 1921, showed that the mortality from both tuberculous and nontuberculous respiratory diseases had increased over those from 1910–1912. At present, boring is done more quickly and much more dust is produced. The risks of drilling can be diminished by such dust-catching devices as the Hay and Trewill dust-traps, now used in South Wales, but further research is needed.—*Pneumonoconiosis with Special Reference to the Silico-Anthracosis of Coal Miners, S. L. Cummins, British M. J., August 17, 1935, no. 3892, 287.*—(*A. P.*)

Nature and Diagnosis of Silicosis.—Heffernan finds it necessary to correct his ideas of five years ago and to retreat from some of the positions he formerly took. He deprecates recent proposals to extend the application of the term to include a variety of dusts as aetiological agents and to include pathological pictures which do not correspond with that so beautifully worked out by Simpson and Strachan in South Africa and Stuart and Foweather in Great Britain. He refers to the recent contention that the active agent is not free silica but a fibrous secondary mica, sericite. The present position is so confused and unsatisfactory that it seems advisable to go back to the concepts of Haldane and Mavrogordato. Heffernan formerly described the "leafless tree, the tree in bud and the tree in leaf." These picturesque similes do not correspond with the actual histological or roentgenographic pathology. Thickened branching shadows are much more common in nonsilicotic conditions, such as chronic bronchitis, cardiac disease, syphilis and nonsilicotic dust affections,—for instance, those in card-room workers than in true silicosis. Heffernan has recorded 94 cases of silicosis in Derbyshire, all of the classical type. Most were simple silicosis without evidence of added infection. They occurred in the millstone-grit industry, the quartzite brick industry, and the potteries or stoneware works of Southern Derbyshire. The Derbyshire coal-miners are free from silicosis, despite the extensive use of shale in "dusting" the mines. In December, 1934, there were 40,572 coal-miners working in Derbyshire. Samples of this shale rock, as reported by the Mines Research Board, consisted mostly of clay, aluminum silicate, and did not average over 38 per cent free silica. They do contain appreciable amounts of sericite. In certain mines alabaster, gypsum and limestone dust are used. Gypsum appears to be the most innocuous. A case is cited of a laborer in a quartzite brick-works, who drew compensation for silicosis for some years, and a post-mortem following sudden death showed neither silicosis nor tuberculosis, but serious cardiac and renal disease and a probable infarct of the right lung. Ten or fifteen years ago, when earlier and earlier diagnoses were being sought, we had the "pretuberculous" child and thought we had found the "anteprimary silicotic." We know better now. Mavrogordato has shown that the characteristic lesion in silicosis is the silicotic nodule or islet, rarely over 2-mm. diameter, larger areas of fibrosis consisting of conglomerations of these. Sutherland and Bryson found the same condition. The International Commission on Silicosis decided in 1930 that to produce silicosis "silica must reach the lungs in a chemically uncombined state." The essentials of this definition, while challenged, have not been successfully confuted. It is now obvious that other forms of pneumonoconiosis, with a different histopathology, are far more common and serious than were supposed. There are also combinations, diseased lungs being dust-traps, so that in some cases it may be difficult to decide on the predominating pathological process. The fact remains that silicosis, "the pathological condition of the lung produced by the inhalation of silicon dioxide," is an unique pathological entity. Heffernan makes the following points: *1:* Silicosis is a nodular fibrosis of the lungs, produced by inhalation of siliceous dust.

2: The interaction which produces silicosis is electrochemical and is typically caused by free silica, for instance, quartz acting upon certain pulmonary tissues. *3:* Silica is active, electrochemically, (a) at the surfaces of the particles of freshly powdered silica (aerosol) and (b) in freshly made hydrosols. *4:* There is reason to suspect that certain mineral silicates, such as asbestos, when freshly pulverized into fine powder, are also electrochemically active at the surfaces of the particles and capable of acting in a similar manner to powdered quartz but to a much more limited extent, setting silica partially "free" at the surfaces. *5:* The properties of the silicates mentioned depend upon their stereochemical crystal structure. *6:* The harmful properties of the dusts referred to above are considerably modified by the presence of certain other dusts. *7:* There is reason to believe that aqueous "solutions" of some silicates are "systems" containing, when freshly made, active silica hydrosol. Heffernan has committed himself to a chemical as opposed to a mechanical theory of silicosis. This term, of course, includes "colloidal." There were formerly two mechanical theories of silicosis, one of which, the direct traumatic, has had to be practically abandoned; the other, based on the idea of mechanical blockage of lymphatic vessels, is also almost certainly wrong, since the fibrosis and contraction of the lungs which occurs in silicosis is not in the least like the picture seen, for example, in elephantiasis. Lymphatic obstruction and stasis are late phenomena and not characteristic. They occur much more with mixed and nonsiliceous dusts and when there is associated infection. They appear to play a part in the silicoanthracosis of South Wales, which is unknown in Derbyshire. The initial silicotic lesions, as shown by Simpson and Strachan, are mainly subpleural, in the little masses of lymphoid tissue surrounding the necks of the infundibuli. The hilum is not the seat of early silicosis. Years ago Mavrogordato called attention to the "early pleural drift" of the dust-cells. The first pointers toward the electrochemical theory were the results obtained by Gye, Purdy and Kettle with silica hydrosol and their observation that it had to be fresh to be active. The next was the discovery of an acute form of silicosis among girls packing siliceous scouring powders. The third was the experimental work of Gardner and Cummings. They showed that "the rate of reaction to particulate silica injected intravenously is inversely proportional to the size of the particles. Control injections of the same quantity of aluminum oxide (emery) particles cause no necrosis or proliferation. . . . Uncombined silica causes a very rapid necrosis . . . not produced by silicates and nonsiliceous dust. . . . Sericite . . . produces inflammation but no necrosis. Its action simulates that of granite . . . a mixture of silicates with quartz. Other substances containing no silica are practically inert." In previous experiments Gardner found that quartz dust produced silicosis in guinea pigs when inhaled, while granite dust did not. Sericite is put low among the reaction-producing silicates, carborundum (silicon carbide) still lower, and nonsilicic coal and gypsum lowest of all. Elsby, Bragg, Taylor and others have studied carefully the chemical structure of silica and the silicates. In normal crystalline forms or completely gelled colloids, the systems are "closed," "satisfied" and electrochemically inert. When a crystal of quartz or a bundle of asbestos is smashed to powder by a blow, the fragments will be "open" and electrochemically active. The relative activity of the dust of free and combined silica can perhaps only be determined by a systematic study of the surfaces by X-ray spectroscopy. Clay will certainly remain inert. The talcs and mica may be slightly active. The crystalline structure of the sericites remains to be studied and such experiments are under way at Toronto, Saranac Lake, and the Mayo Foundation. *Diluent dusts and their action:* That such dusts modified, decreased or eliminated the harmful effects of silica was long ago pointed out (1926), and Collis and Smith added further evidence. There is direct evidence in Derbyshire of the protective value of clay-dust. Here brick-works make silica firebricks from clayey silica sands found in the Derbyshire limestone plateau about 1,000 feet above sea-level. A certain amount of kaolinite is present in these sands, and the free silica content is about 91 per cent. The mining, grinding and preparation of the material is a dusty process, dust accumulating on roof-beams, steam-pipes, etc. For centuries, in Derbyshire, silica brick-making has been regarded as a particularly healthy occupation and statistics support this. In 1917, a medical and X-ray examination disclosed one case of pulmonary tuberculosis and none of silicosis among these workers. Nevertheless, the works were included in the Refractories Industries Compensation Scheme. Haldane and coworkers in 1924, analyzed dust samples from sheds and found the finer dust to contain only 34 per cent free silica, and sand itself 88 per cent. They considered the shed-dust harmless.—*What is Silicosis? P. Heffernan, Tubercle, June, 1935, xvi, 397.*—(*A. P.*)

Silicotic Pseudotuberculoma.—Two cases of subcutaneous pseudotuberculoma are described, caused by the implantation of siliceous material and not by the tubercle bacillus, similar to the one described by Shattock, (*Proc. Roy. Soc. Med., 1916–1917, x., Section of pathology, p. 6*) under the name of *Pseudotuberculoma silicoticum.* In one case the implantation appeared due to an accident in which the arm was cut with slate. Petrological analysis of the siliceous material in the pseudotuberculoma of the arm proved its identity with a definite variety of slate in the garden where the accident occurred. In both cases examination of the sectioned tissue by polarized light, with demonstration of doubly refracting crystals in cells and tissue spaces, proved the nature of the lesion.—*Pseudotuberculoma Silicoticum, J. S. Faulds, J. Path. & Bact., July, 1935, xli, 129.*—(*E. R. L.*)

Silica Content of Infants' Lungs.—From the analysis of 14 lungs from a 6-month foetus to a 3-year-old infant, the average silicon-dioxide content was 0.34 mgm. per gm. dried tissue. The smallest amount was 0.019 mgm. and the largest 1.29 mgm. in a 10-day-old infant. In the placentae the average content was 0.294 mgm. per gm. of dried tissue. Per gram of dried blood, 0.13 mgm. of silica was found. Placental blood averaged 0.32 mgm. per gm. In the umbilical cord an average of 0.33 mgm. of silicon-dioxide per gram of dried tissue were found. The presence of fluoride in the blood accounts for the formation of fibrous tissue from inhaled silica, and strengthens the opinion previously rendered that silicosis is caused by chemical rather than by traumatic action.—*The Silicon Dioxide Content of the Lungs of Infants and of Placental Tissue, W. D. McNally and W. L. Bergman, J. Indust. Hyg., July, 1935, xvii, 171.*—(*L. F. B.*)

Electric Welding Hazard.—Fume fever may be acquired by breathing dense clouds or fumes of freshly formed metallic oxides like zinc and magnesium. There seems to be no reason why the fever could not be caused by finely divided fumes of ferric dioxide and aluminum oxide. Cats and rabbits were placed inside the welding cabinet in which concentrations of ferric oxide were determined from time to time. In several experiments the animals breathed filtered air from the cabinet. Another group were exposed to red ferric-oxide dust. Blue annealed steel was welded and bare iron rods were used as electrodes. Some of the animals exposed to the unfiltered fumes died during the experiments. The general finding at autopsy was severe pulmonary oedema. The lungs were often haemorrhagic, darkly pigmented and frequently swollen. Animals breathing filtered air appeared the same, showing that removal of the solid fume particles does not eliminate the toxic properties of the gases. Results from animals breathing pure red ferric oxide were uniformly negative. The exposures of the animals varied from 48 to 510 minutes at concentrations of ferric-oxide fumes averaging from 35 to 250 mgm. per cubic metre. In field studies the concentration varied from negligible amounts to 130 mgm. per cubic metre, depending mostly upon ventilation about the operation. Nothing was found to condemn modern welding practice, but the findings show that arc-welding should not be done in a poorly ventilated or confined space unless the welder is protected. The cause of the pulmonary oedema is not the iron-oxide particles, but gases, probably nitrogen peroxide and ozone, generated by the arc.—*Electric Welding. I. The Respiratory Hazard, A. C. Titus, H. Warren and P. Drinker, J. Indust. Hyg., July, 1935, xvii, 121.*—(*L. F. B.*)

Fatal Pneumonia from Electric Welding.—It is understood among welders that a man is not supposed to work two successive days on a similar job, but because this work was to be rushed a welder was asked to work a second day on it. A 500-gallon galvanized tank was being welded together in a very poorly ventilated furnace room. The man was found unconscious at the end of the second day, developed signs of pneumonia that night, which became progressively worse, and died 6 days later. Autopsy revealed both lungs completely consolidated, covered by fibrin and plaques and densely bound down by adhesions. There was engorgement of the liver, acute congestion in the kidneys and complete denudation of the gastric mucous membrane. Death resulted from repeated exposures to the nitrous gases generated by the electric arc. Places where such work is carried on should be properly ventilated.—*Electric Welding. II. An Acute Fatal Pneumonia Following Electric Welding of Galvanized Iron in a Confined Space, F. L. Williman, J. Indust. Hyg., July, 1935, xvii, 129.*—(*L. F. B.*)

Prevention of Electric Welding Hazard.—The respiratory hazard can be avoided by ensuring that the welder breathes reasonably clean air. The concentration of iron-oxide fume particles can be used as an index of air cleanliness. The concentration

should be kept below 10 mgm. per cubic metre. In welding galvanized iron or pouring brass, concentrations of zinc fumes should be kept below 56 mgm. per cubic metre for short exposures and under 19 mgm. for long exposures. The exact nature of the gases generated are not known, but safe concentrations are given as 39 parts per million for nitrogen peroxide and less than 1 part per million for ozone. General ventilation of the place where welding is done will reduce the air pollution but is likely to be more expensive than local hoods. Local exhaust hoods of 3 x 5 inches requires about 205 C.F.M. at 5 inches. A velocity of 200 F.P.M. toward the hood is sufficient to collect the fumes. Respirators with adequate filters and gas absorbing cartridges or canisters may be used but should not be substituted for adequate ventilation. Airmasks with a supply of clean compressed air make working safe where it otherwise would not be.—*Electric Welding. III. Prevention of the Respiratory Hazard, P. Drinker, H. Warren and R. Page, J. Indust. Hyg., July, 1935, xvii, 133.*—(*L. F. B.*)

Classification of Cancer of Lung.—The chief interest at present in carcinoma of the lung centres on the question of surgical removal. Consequently this study of 250 cases has been concentrated upon the gross topography and distribution of the tumors. A sharp separation is made between localized and nonlocalized types of lesions. The circumscribed forms include parenchymal and peripheral cancers. The former are spherical, well-demarcated growths, unrelated to macroscopic bronchi, and grow by expansion. The lymphatic channels are free from cancer cells and regional lymph nodes may be uninvolved at autopsy. Patients die of distant blood-borne metastases. Peripheral cancers originate in smaller bronchi and extend outward. They form dense masses which extend to and through the pleura to chest-wall, diaphragm and ribs. There is late invasion of the lymph nodes. Both these types offer possibilities for operative treatment. The nonlocalized tumors constitute about three-fourths of all pulmonary cancer cases. There are two types. Main-bronchus and branch-bronchus tumors. Regional lymph nodes are involved early and massively. This type of cancer is a permeating form and shows widespread central invasion. Main-bronchus cancers are not operable usually by the time the patient is ill enough to enter a hospital. Reclassing all tumors as arising in the root zones or in the parenchymal zones, it is stated that the former are primarily inoperable. In the symptomatology cough is variable depending upon the bronchial involvement. Pain is most important in the parenchymal forms. Clubbing of fingers may be the first abnormal sign. Roentgen examination is a most reliable method for the diagnosis of localized tumors. Bronchoscopic examination and biopsy make possible a positive diagnosis, but the absence of ulcerating or stenosing lesions does not exclude cancer. Delay in operation in the favorable types is inexcusable. The presence of metastases and obvious weakness of the patient are the only contraindications in the localized forms. In the nonlocalized forms the diagnosis is always made late.—*A Topographic Classification of Primary Cancer of the Lung. Its Application to the Operative Indication and Treatment, C. B. Rabin and H. Neuhoff, J. Thorac. Surg., December, 1934, iv, 147.*—(*J. F. B.*)

Malignant Tumors of Lung.—Malignant new growths of the lung are common at present. Comparisons with recorded incidence in the past are fruitless and misleading because of recent perfection of diagnostic facilities. According to reliable statistics neoplasms of the lung rank next to those of the gastrointestinal tract, breast and uterus. Most of them arise from the mucosa of the smaller bronchi. The correct interpretation of symptoms and signs, which are usually present, should lead to the appropriate diagnostic investigations. From the point of view of prognosis early diagnosis is important, but the results of all therapeutic measures are disappointing. Because there are no characteristic symptoms early recognition of the disease requires attention to suspicious points in history, symptomatology and examination. *Symptoms:* In about one-quarter of the cases the onset is sudden, simulating pneumonia, pleurisy or influenza. After such acute incidents the patient may appear to recover his health for weeks or months. In most cases, however, the onset is insidious, with cough the most prominent symptom. Chest pain, shortness of breath and blood-streaked sputum are other fairly common symptoms. In another group, symptoms of mediastinal pressure occur, such as dyspnoea, dysphagia, voice-changes and oedema of the face and arms. In a rare group carcinoma of a bronchus may exist with no symptoms or signs, and the first evidence may be a distant metastasis, especially in the liver, pancreas and central nervous system, giving rise to obstructive jaundice or spastic paraplegia. Cough may result from suppuration distal to the growth, often accompanied by copious and sometimes offensive sputum; or from tracheal pressure, when it is of "brassy" character,

usually with little sputum. With involvement of the recurrent laryngeal nerve the cough is husky and ineffective. Tracheal pressure also causes stridor, a feature of the later stages. Haemoptysis of some degree occurs in nearly all cases at some stage, rarely profuse. The pain may be due to (1) strain of excessive coughing, (2) invasion of the bony chest-wall, or (3) involvement of the posterior nerve-roots by secondary deposits. Dyspnoea gradually increases in severity, in some cases aggravated by development of pleural exudate. *Physical signs:* These are varied, depending on the location of the growth and the presence of secondary changes in lung, pleura and mediastinum. If a main or large secondary bronchus is obstructed there will be evidence of pulmonary collapse distally, such as diminished movement, impaired resonance, weak breath-sounds and deviation of heart and trachea toward the affected side. Secondary suppurative and inflammatory changes distally may cause signs of consolidation or cavitation, simulating abscess, gangrene or pneumonia, or in more chronic cases the clinical picture is that of bronchiectasis. Involvement of the pleura with the formation of exudate is an early complication in many cases. Pleurisy with effusion, occurring suddenly in middle age, should always suggest a growth. Metastases are most common in the regional mediastinal lymph nodes, and also those of the neck, axilla and upper abdomen, including liver, pancreas and suprarenals. Rarely, cutaneous deposits occur in the chest or abdomen. Wasting is not necessarily marked and the temperature, when elevated, depends on the presence of inflammatory complications. Dilated veins over the chest and abdomen are a valuable sign of mediastinal pressure. In general the three most common types of lesions give signs of collapse, suppuration and pleural exudate. *Special methods of investigation: 1: Sputum:* The presence of tubercle bacilli does not rule out a growth, as tuberculosis may coexist. At present malignant cells can rarely be recognized. *2: Blood Wassermann reaction:* This is positive in about 20 per cent of cases and too much weight should not be attached to it. Again, syphilis may coexist. In cases of doubt, intensive antisyphilitic treatment may be given. *Pleural exudate:* The only definite positive finding is the presence of Foulis cells, a fairly good indication of neoplasm. *X-ray examination of the chest:* A skiogram should be taken in every case in which there is a suspicion of serious disease, even without physical signs. Preliminary fluoroscopy is also valuable. Immobility or paradoxical movement of the diaphragm is important; also the presence or absence of pulsation. The appearance of neoplastic growths varies from irregular rounded shadows projecting from the hilum to mediastinal or parenchymal masses. Sometimes the appearance of pulmonary collapse or pleural exudate of lipiodol may help to visualize the tumor or an area of bronchial obstruction. *Bronchoscopy:* This is the most useful diagnostic method, performed under local anaesthesia, and tumors of main or large secondary bronchi can be quite completely studied and material removed for biopsy. *Thoracoscopy:* In some cases this method is more useful than the foregoing, especially in cases with a pneumothorax. *Exploration:* The chief methods of attack are surgical and radiotherapeutic. Lobectomy is only successful when the diagnosis is made early and a definite pedicle can be defined. It is applicable to a small minority of cases. The late results of X-ray therapy are disappointing but relief of urgent and distressing symptoms may be striking.—*New Growths in the Lung, J. Maxwell, British M. J., February 23, 1935, no. 3868, 369.*—(*A. P.*)

Benign Tumors of Bronchus.—In 1933, Wessler and Robin reported 17 cases, and noted that not more than 30 such case-reports had appeared in the literature. In this paper, Morlock and Pinchin record 9 cases observed bronchoscopically and treated at the Victoria Park Hospital, London. The incidence in relation to all new growths, on the basis of 150 cases bronchoscoped in four and one-half years is 6 per cent. Their benignancy is histological only, as in their mechanical effect they are a grave menace and will often cause permanent damage or danger to bronchi and lungs, giving rise to complications which may endanger life or even prove fatal. *Symptomatology:* Most cases occur before the end of the third decade. When small, they produce few or no symptoms, cough usually being the first, occasionally an asthmatoid wheeze. Bleeding is often the first symptom for which the physician is consulted. It occurred in two-thirds of this series. Wessler and Robin describe it as of sudden onset and abrupt cessation. It usually occurs in a main bronchus, from submucous vascular spaces, and is promptly expectorated. Haemoptysis may remain the only symptom for years. As the tumor grows the danger increases until symptoms of bronchial obstruction arise, with atelectasis, often of sudden onset, with signs simulating pneumonia. A later complication is pulmonary suppuration, and by this time the signs and symptoms of bronchiectasis are present. Empyema is a still later

complication. *Histology:* One must be critical of the reports of sections. While inflammatory polyps may be secondary to suppuration, they are rare in simple bronchiectasis and abscess. The bronchoscopic appearance may warrant a surmise as to the presence of malignant tumor. A negative lipiodol bronchogram without bronchoscopy is not conclusive. *Treatment:* Removal is indicated before permanent damage occurs. Fibromata may be removed piecemeal, and inflammatory polyps removed and the base cauterized with silver nitrate. Adenomata and hemangiomata, however, are better dealt with by diathermy and insertion of radon seeds.—*Benign Neoplasms of the Bronchus, H. V. Morlock and A. J. S. Pinchin, British M. J., August 24, 1935, no. 3894, 332.*—(*A. P.*)

Cancer of Bronchus.—Increasing knowledge of bronchial carcinoma necessitates revision of opinions previously held. The literature extant leads largely to confusion in diagnosis and hopelessness in prognosis. Lloyd believes that with a well-ordered knowledge of clinical syndromes and a proper application of present technique, the diagnosis should always be made early and such rapid strides are being made in the field of thoracic surgery that a number of these growths, if favorably situated, are removable and carry a hopeful prognosis. In many cases, symptoms definitely indicative of bronchial carcinoma exist and persist for months, or even years, before the chest is X-rayed. However, records of successful surgical removals are now appearing in the literature with increasing frequency. Clinical apprehension of the disease, however, lags unjustifiably, in view of the information available. *Classification:* A clinical classification which cannot be utilized for diagnosis, prognosis or treatment is useless. Fortunately, the anatomy of the chest and the mechanics of respiration are such that a simple and sane subdivision of these tumors can easily be made. The bifurcation of the trachea is situated almost exactly at the geometric centre of the air-bearing lung tissues. Departing from this point the thorax may be divided into three zones, (1) a central or hilar zone, (2) a middle or bronchial zone, and (3) a peripheral or parenchymal zone. The lesions occur then as follows: Central zone, hilum infiltration; middle zone, bronchial obstruction; and peripheral zone, centrifugal expansion. To these must be added the rarer types of "miliary carcinomatosis," and the bronchiectatic type, or *cavitaire d'emblée*, described by Letulle, usually accidentally diagnosed bronchoscopically. Tumors usually spring from the trachea and stem-bronchi. Infiltration takes place by extension along the bronchial walls or vascular structures into the lung and hilum lymph nodes, or by direct invasion of surrounding tissues. Obstruction, because of the ample size of the airways, is a late symptom. *I: Bronchial obstruction group:* These growths arise in the second division or smaller bronchi, and give rise to clinical manifestations of impaired drainage up to complete obstruction with atelectasis or pneumonia. *II: Centrifugal expansive group:* A cancer arising in the air-bearing tissue of the lung (terminal bronchiole or alveolus) is surrounded by a soft spongy medium offering reduced mechanical resistance to its expansion, which approaches equality on all sides, resulting in a round and often sharply defined tumor, which continues to grow until some structure is reached which alters its shape or course, such as the pleura and chest-wall. The early stages are most apt to be overlooked and involvement of the chest-wall at once worsens the prognosis. *Symptomatology in diagnosis: 1:* Cough occurred early in 90 per cent, late in 10 per cent. *2:* Pain occurred early in 70 per cent, late in 20 per cent, absent in 10 per cent. *3:* Dyspnoea occurred early in 40 per cent, late in 30 per cent, absent in 30 per cent. *4:* Pneumonitis (with symptoms of bronchitis, colds, grippe or pneumonia) had the same occurrence as dyspnoea. *5:* Haemoptysis occurred early in 30 per cent, late in 20 per cent, absent in 50 per cent. *6:* Loss of weight occurred early in 30 per cent, late in 65 per cent, absent in 5 per cent. *7:* Asthma occurred early in 5 per cent, late in 15 per cent, absent in 80 per cent. *III: Hilum infiltrating group:* Substernal pain and discomfort and pain radiating along the distribution of the cervical or brachial plexus were most common. At times there is an unbearable shoulder-ache. The pain is never of the localized burning substernal type associated with acute bronchitis. Dysphagia, dysphonia, gastric dysfunction and cardiac disturbance, are due to direct extension, or to involvement of their nerve-supply by the growth. Cough usually occurs earlier than is generally admitted and is apt to arouse apprehension of tuberculosis as is haemoptysis when it occurs. *1: Bronchial obstructive group symptoms:* Cough is nearly always the chief complaint, as there is retention of secretions and localized bronchitis. It may be paroxysmal and there is often bloody sputum and occasionally haemoptysis. A story of repeated "colds" with chills and fever is also common. Shortness of breath gradually develops, with some degree of pain or dis-

tress. *2: Centrifugal expansive group-symptoms:* Here there is probably a "silent period" of unknown duration when the patient may realize something amiss, but is unable to describe it other than perhaps as a "sense of oppression" or "weakness in the lung." Later pleural pain, sharp and stabbing, occurs, or intercostal neuralgia and shoulder pain. Haemoptysis was absent in this series and cough less distressing. *Physical examination:* Most constant and important was limitation of the affected hemithorax. Neumann has described as a most valuable sign a "solid" dulness in the medial portion of the infraclavicular fossa, encroaching on the manubrium but differentiated from cardiac dulness. This is not, however, an early sign. The hilum-infiltrating group may present diverse indirect signs due to pressure, while the bronchial obstructive group more often show evidence of some degree of atelectasis, consolidation or effusion, which however frequently vary greatly. They always indicate, however, a unilateral bronchitis or asthma, a localized atelectasis or effusion, or some combination of these. There is a greater variety of signs than in true pneumonia, the louder sounds being well transmitted but the finer suppressed. The asthmatoid wheeze may occur and is to be differentiated from the laryngeal wheeze. Tumors of the centrifugal-expansive type may reach considerable size with little evidence except diminished respiratory movement, but early invasion of the pleura produces signs of a circumscribed effusion, while apical infiltrations must be differentiated from tuberculosis. Enlargements of regional lymph nodes are common. *Roentgenographic findings:* These are usually more informative than those of any other method of examination. In the hilum-infiltrating group, the early stages may be overlooked. Widening of the mediastinal shadow, bulging and fixity, rigidity or deformity of the oesophageal lumen are significant; also, reduction in size of the hemithorax, shifting of trachea and mediastinum toward the lesion, and triangular shadows at the lung root pointing outward or broad bands or multiple radiating striations. The bronchial-obstructive group show evidence of partial atelectasis or cavitation or both. The distribution differs from that of chronic suppuration in tending to self-limitation (intralobar) and the later occurrence as a rule of pleural complications. While inflammatory conditions show a convex outline of the interlobar fissure, tumor-growth results in a concavity due to shrinkage. In the centrifugal-expansive group the tumor outline will be round until some important structure is encountered, but it may be obscured by collateral inflammation effusion or atelectasis. *Special diagnostic methods:* Most important is bronchoscopy. In practically all growths of the central zone and most of the middle zone, tissue can be obtained for biopsy. When seen, the growths are cyanotic, fungating and ulcerated, with secondary localized bronchitis. If haemorrhage occurs following biopsy, the blood should be sucked out and pressure applied by the bronchoscope or a narrow tape packing left *in situ*; otherwise atelectasis, fever and prostration will ensue. Bronchoscopy is of little or no value in tumors of the peripheral type comprising about 35 per cent, therefore, a negative bronchoscopic examination is not conclusive. In this type, however, diagnostic pneumothorax and subsequent thoracoscopy may be of value, or a diagnostic tap if there is pleural effusion. When such a tap is done, the fluid should be replaced by air. Attempted biopsy from the pleural surface has not been successful; but a lusterless, foggy appearance over one lobe is very suggestive, also absence of the normal wave-like fluctuations on respiration of the lung surface and a blunted costodiaphragmatic sulcus, Punch biopsy is justifiable when the tumor has been accurately localized by X-ray thoracoscopy or both. Bronchograph is a practical office procedure and may show obstruction, stricture or deformity. It is not a substitute for bronchoscopy. *Analyses of cases:* Of 31 cases observed, 28 ran a typically malignant course, their ages being from 36 to 68 years. Of 25, who died, only one lived over a year and he was untreated. There was commonly some leucocytosis, averaging 15,000 per cmm. Satisfactory biopsy material was obtained in 17 of 24 bronchoscoped. In 2 cases, in which malignant tissue was not found, definite malignant characteristics were observed and in 3 other cases with microscopic evidence of malignancy the appearance and course were benign. Doubt is cast on reports of malignant growths cured by bronchoscopic removal. The bronchial-obstructive group was most numerous, 20 cases. *Summary:* A classification is offered of malignant primary carcinoma of the lungs and bronchi, omitting the rarer forms. The early manifestations are especially discussed and a number of roentgenographic reproductions shown. —*The Early Classification and Early Diagnosis of Cancer of the Bronchus, M. S. Lloyd, New England J. M., July 18, 1935, ccxiii, 101.*—(*A. P.*)

Bronchogenic Cancer.—A study of 1,773 necropsies revealed an incidence of 1.2 per cent of bronchogenic carcinoma. From

January, 1926, to October, 1934, there were 123 such diagnoses made, but only 54 cases were studied in detail because only they were proved beyond doubt by bronchoscopy with biopsy in 26 cases; necropsy, 20; biopsy of accessible metastatic foci, 4; malignant cells in the pleural fluid, 4. The X-ray in most cases gave the original clue. The age range was 9 to 73 years, with 63 per cent between 40 and 73 years. Males predominated, being 73 per cent of the cases. The main bronchi were most common sites, with the upper primary divisions next in frequency. Localization was in the right side in 29 cases; left, 22; trachea, 3. In 20 per cent the symptoms began less than 3 months before admission to the hospital, and, in about 50 per cent, 3 to 12 months previously. The usual mode of onset was that of an insidious, afebrile, pulmonary condition. In 16 cases, or 30 per cent, the initial symptoms due to the malignant tumor were atypical: pneumonia, 5; acute cardiac decompensation, 1; osseous metastases, 5; cerebral involvement, 2; dysphagia, 1; jaundice, 1; massive thrombosis of the venous circulation of the neck, chest, shoulders and arms, 1 case. Cough, variable in degree, was the earliest and most frequent symptom, occurring in 92 per cent. The clinical picture of lung abscess was not encountered, although distal pulmonary suppuration was frequently found at bronchoscopy and necropsy. Frank haemorrhage was uncommon, but slight blood-splitting occurred in 52 per cent. Chest pain, progressive in degree, was encountered in 74 per cent. Loss of weight and weakness were observed in 72 per cent but seldom in the first 6 months. Dyspnoea, present in 40 per cent, was also a relatively late symptom. Hoarseness occurred in 18 per cent. Four cases were incorrectly diagnosed,—3 as tuberculosis, and one as carcinoma of the thyroid with pulmonary metastasis. In 18 per cent of the cases, metastasis was the first indication of malignant disease. The 20 necropsies revealed that metastases to the hilar, mediastinal and cervical lymph nodes were most frequent with the bones, lungs, pleurae, liver, adrenals and brain, following in that order. Skin metastases occurred in 10 per cent of the cases. Once symptoms were well established, the progress was rapidly downgrade, since 37 of the 54 have died: 29, within one year after diagnosis; 7 within 3 years; and one, an angioendothelioma of the right main bronchus, after 10 years. Radiotherapeutic results have been very discouraging; in most cases, the lesion was too far advanced. It did, however, shrink the neoplasm, giving better pulmonary drainage and less cough; and, in some instances, there was ossification of the rarefied metastatic areas and complete subjective relief. Cases for surgery were few, since 72 per cent of the series had root infiltration and in many more the extent of the disease was obscured by pleural effusion. A roentgenological examination was made in 51 cases; in 44 of these the films were available for study. From these an anatomicopathological classification was made. In the main the clinical course runs quite parallel to it. *1: Early cases* (32 per cent). Early opacity with little or no fuzzy parenchymal infiltration was a constant finding. Size of lung field normal except in 9 cases; no pleural fluid. *2: Moderately advanced cases* (25 per cent). In addition to the above were found definite inequality of the lung fields, elevation of the diaphragm, and slight to moderate parenchymal involvement. Mediastinal retraction and pleural effusion were each present in one case. *3: Advanced cases* (43 per cent): Hilar and pronounced parenchymal infiltration, mediastinal retraction, and lung shrinkage are added to the above findings. Fluid obscuring the radiographic picture was a frequent finding. The diaphragm was elevated in about half of this group. Roentgenograms were available for study in 17 of the 20 cases examined postmortem with agreement in twelve. Two cases considered as moderately advanced were found to be advanced; one considered advanced was found to have been caused by a polyp; and two were missed completely, one of which was retrocardiac in the left minor lower bronchus and the other a minimal lesion in a main bronchus. Bronchoscopy is the most valuable and positive single diagnostic aid. Artificial pneumothorax is another special radiological procedure which may demonstrate deposits in the parenchyma or on the pleura. X-ray, being more easily obtainable and pleasant, should be done first. Though the film may be negative, bronchography should be urged in all cases in which there is a suspicious clinical picture. It is precisely these very early lesions, not roentgenologically demonstrable, that may be most benefited by treatment. Of 51 cases studied roentgenologically, 23 were positively diagnosed and 12 were suggested. Of the above cases 31 had bronchoscopy; in 26, the diagnosis was conclusively established; in 2, biopsy was not done; and in the other case the lesion was inaccessible to the bronchoscope.—*Bronchogenic Carcinoma. An Analysis of 54 Cases with a Roentgenological Classification, M. G. Wasch and B. S. Epstein, Am. J. M. Sc., September, 1935, cxc, 362.*—(*E. M. J.*)

Pulmonary Carcinomatosis with Aspergillosis.—There have been many reports of primary aspergillosis in both man and other animals, and it is said to occur primarily in pigeons as a pulmonary disease. Its significance and association with other

lesions in man has been the subject of controversy. Only one case has been reported of its association with pulmonary carcinoma, that of Kampmeier and Black. The case here reported showed confusing and conflicting clinical roentgenographic and laboratory findings. *Case report:* This 30-year-old American housewife was admitted to the Springfield Hospital, October 28, 1934, complaining of cough, dyspnoea and weakness of three months' duration. A chest roentgenogram in April, 1933, had been negative, but in August, 1934, an appearance was noted suggesting miliary tuberculosis, but a Pirquet test and sputum examination were negative. Later a mould, *Penicillium glaucum*, was found and still later *aspergillus*, together with Curschmann's spirals. By October, coughing spells were severe and exhausting, and on admission to the hospital dyspnoea was so severe as to require an oxygen tent almost continuously. Chest signs were most marked at the bases, where there were crepitant râles and diminished breath-sounds with some impairment of resonance throughout. The X-ray films showed disseminated mottling throughout, increased in density compared with previous films. Bronchoscopic examination showed a diffuse dusky inflammatory appearance but little secretion (November 5, 1934). The patient died six days later. Necropsy findings showed disseminated fine pulmonary nodules with creamy white fluid in the bronchi. These proved, on histological examination, to be primary endobronchial carcinoma and there were also liver metastases.—*A Baffling Case of Pulmonary Carcinomatosis, J. C. Edwards, New England J. M., July 4, 1935, ccxiii, 15.*—(*A. P.*)

Cancer and Tuberculosis.—As a debilitating disease, cancer is occasionally complicated by an exacerbation of a pre-existing smoldering tuberculous process. In a few instances in which tuberculosis developed after carcinoma, the tuberculosis was often confined to the lung in which the tumor existed. In many cases it is thought that an aetiological relationship exists between the two diseases. Studies show cancer cells found in a tuberculous cavity to have originated in the bronchial wall and to have invaded the cavity later. The process of "cancerization" of a cavity is analogous to the epithelialization of a cavity observed in tuberculosis. Epithelialization proceeds from a damaged bronchus whose mucous membrane contains scattered groups of basal cells only. The cells invade the dry cavity, lining it in a syncytial manner or they grow in clumps. "Cancerization" of a dry cavity occurs analogously when the cavity is connected with a bronchus whose mucous membrane has become malignant. Carcinoma does not start in a tuberculous scar but it may be invaded from a bronchus. The ages of the 13 cases studied varied from 45 to 71 years. In 10 the tumor was on the left and 3 on the right side. The upper lobe was involved in 11 cases and the lower lobe in 2. The cancer in 5 cases was of the small-round-cell variety, 6 were squamous-epithelial type, one keratinizing epidermoid, and one adenocarcinoma. The sputum was negative for tubercle bacilli in 10 cases and positive in 3. The tuberculous lesion found was of the healing fibrotic type. The duration of illness was apparently the same as in patients with pulmonary cancer not complicated by tuberculosis. In cases of chronic pulmonary disease, in middle-aged people or older, with persistence of symptoms, the possibility of malignant disease should be considered. The presence of tuberculosis does not exclude the existence of a malignant tumor in the same lung.—*Primary Carcinoma of the Lungs Combined with Pulmonary Tuberculosis, B. M. Fried, Am. J. Surg., August, 1935, xxix, 261.*—(*L. F. B.*)

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